INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

105 South Meridian Street
P.O. Box 6015
Indianapolis 46206-6015
Telephone 317/232-8603

Mr. Valdas V. Adamkus
Regional Administrator
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Re: Envirochem ARARs

Dear Mr. Adamkus:

Staff of the Department of Environmental Management have reviewed Exhibit A of the Envirochem Consent Decree regarding its compliance with the Applicable or Relevant and Appropriate Requirements (ARARs) State Environmental Regulations.

This letter is to advise you, on behalf of the State of Indiana, that the soil vapor extraction system as described in Exhibit A to the proposed Consent Decree in the Envirochem matter, if operated as described therein, is consistent with applicable state law concerning air emissions. Specifically, IC 13-7-4-1 prohibits discharges or emissions into the environment, in any form, in violation of regulations duly adopted by the appropriate board and 326 IAC 8-1 regulates volatile organic compound emissions. The vapor extraction system proposed to be utilized in the Envirochem remedy will capture volatile organic compounds on activated granular carbon filters so as to prevent emissions into the environment. The contaminants captured on the filters will subsequently be destroyed by incineration.

All other components of the remedy, as described in Exhibit A, are also consistent with applicable or relevant and appropriate state laws and regulations.

If there are any questions concerning this matter, please contact Mr. Brad Rutledge, ARARs coordinator, at AC 317/243-5038.

Sincerely,

Kathy Prosser

Kathy Prosser
Commissioner

cc: Brad Rutledge

TECHNICAL MEMORANDUM

CH2M HILL

TO: Karen Vendl
U.S. EPA
CERCLA Enforcement Section

FROM: Al Sloan/CH2M HILL/Milwaukee

PREPARED BY: Dan Plomb/CH2M HILL/Milwaukee

DATE: January 17, 1990

SUBJECT: Northside Sanitary Landfill/Environmental Conservation and Chemical Corporation Variable Head Hydraulic Conductivity Testing and Analysis

PROJECT: GLO65555.TS.PT
GLO65556.TS.PT

INTRODUCTION

Aquifer tests were conducted on several of the monitoring wells at the Supplemental Investigation Area south of the Environmental Conservation and Chemical Corporation (ECC) site and southwest of the Northside Sanitary Landfill (NSL) site on October 24 and 25, 1988. Hydraulic conductivity values of the surficial sand and gravel aquifer were measured using variable head (slug) tests. The slug tests were performed to provide information that will be used during the design of a groundwater extraction system, and also in calculations related to groundwater and contaminant velocities. This memorandum describes the test methods, data evaluation procedures, test results and data limitations for the tests performed at the site.

Variable head tests are single well tests used to estimate hydraulic conductivity in the vicinity of the well screen by adding or removing a known volume of water. The rate at which the water level in the well recovers is measured and used to estimate the hydraulic conductivity.

The tests conducted were "rising" head tests. By applying an artificial head pressure to the well, either in the form of a solid PVC slug or a volume of inert gas under pressure, a known volume of water is then displaced through the well screen back into the aquifer. When the well has fully stabilized from this stress, the slug (of either PVC or gas pressure) is removed, instantaneously lowering the water level. Data were then collected while water levels recovered within the well. Tests were performed by Dan Plomb, Kevin Olson, and Jan Williams of CH2M HILL.

Tests were performed on monitoring wells ECCMW13, 14, 15, 16, 17, 18, 19B, 20, 21, 22, and 23. The wells were screened in the shallow sand and gravel unit beneath the site. Tests were performed on the chosen wells because of their locations in the area of the site where groundwater extraction is being considered. Only monitoring wells that were installed and developed during the most recent, predesign investigation were tested. Locations are shown in Figure TM-3-1. All tests were run in triplicate to improve the confidence in the test results.

VARIABLE HEAD TESTING

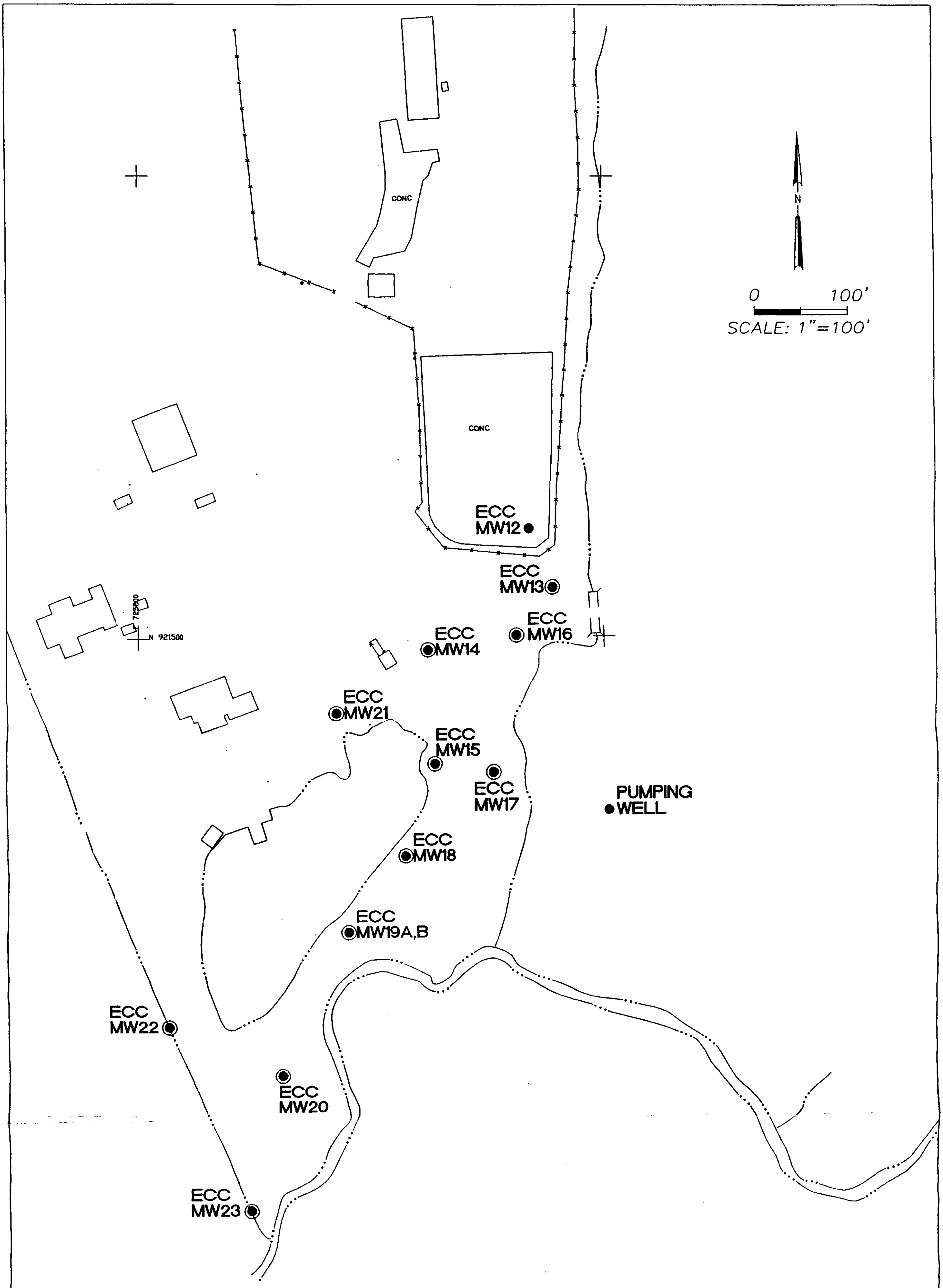
METHOD OF TESTING

Two methods were used to displace the static water column in the wells. The preferred method consisted of displacing water from the well using nitrogen gas. This method is preferred because contact between potentially contaminated wellwater and testing equipment and personnel is minimized, and only a single transducer needs to be decontaminated. In addition to health and safety concerns, the method reduces the possibility of cross-contamination of wellwater when test equipment is moved between wells. Use of the nitrogen depression method is limited to wells in which a sufficient volume of water can be displaced from the riser pipe without lowering the water level below the top of the wellscreen. Because nitrogen gas would leak through the screen, it is not physically possible to use this method when the water level is depressed below the screen. The alternative method, using a PVC slug to displace wellwater, was used when the screened interval was close to or straddled the water table.

NITROGEN DEPRESSION METHOD

Equipment

The test assembly used to displace wellwater using the nitrogen depression method is shown in Figure TM-3-2. The wellhead assembly is attached to the top of the riser pipe. A gastight seal between the assembly and riser pipe is then obtained by mechanically expanding a rubber packer at the base of the assembly. The wellhead assembly contains gastight ports for connecting two pressure transducers, a fitting for attaching a pressure regulator, and a vent valve. The pressure transducers are connected to an electronic data logger (Campbell Scientific Model 21X). Transducer No. 1 measures total head, which is the sum of the elevation head and pressure head above the transducer. Transducer No. 2 measures the pressure head resulting from the nitrogen gas. In addition to recording head values at discrete time intervals for later analysis, the data logger is programmed to



LEGEND

● ECC MW18 — WELLS INSTALLED DURING SUPPLEMENTAL INVESTIGATION

◉ ECC MW23 — WELLS INCLUDED DURING HYDRAULIC CONDUCTIVITY TESTING

FIGURE TM-3-1
SUPPLEMENTAL INVESTIGATION AREA MONITORING WELL LOCATIONS
NSL / ECC TECHNICAL MEMORANDUM NO. 3

CH2M HILL

L65555.TS\FIG3-1 3/24/89

calculate hydraulic conductivity directly in the field using simplifying assumptions regarding aquifer geometry. Therefore, a quick field check on the validity of the data is possible prior to disassembling the equipment.

Testing Procedure

The test procedure generally consists of the following steps. First, the wellhead assembly and transducer equipment are set up at the well location as shown in Figure TM-3-2. The initial water level (with respect to Transducer No. 1) is recorded prior to pressurizing the system. Pressurized nitrogen is then introduced into the riser pipe. Inasmuch as the units of the data logger readout are in feet of water, the equivalent water height due to the nitrogen pressure head is read directly from Transducer No. 2. The amount of pressure head introduced into the well is such that water will be displaced at least 2 to 3 feet, but not below the top of the screen. Pressure is controlled by regulators in the nitrogen supply line. The pressure head forces water from the riser casing into the surrounding formation. As the water level in the well decreases under a constant pressure head, the total head (Transducer No. 1) decreases. Eventually, total head will return to the initial head value (initial water level), except that now the total head above Transducer No. 1 includes the pressure component from the nitrogen gas. At this point the test is started by opening the vent valve to instantaneously release the pressure head by depressurizing the system and starting the data logger. In effect, this is similar to instantaneously removing a column of water equal to the volume of water displaced by the gas. Water levels are then recorded versus time as the water column recovers.

PVC SLUG METHOD

Equipment

In theory, the PVC slug method is identical to the nitrogen depression method except that a PVC slug is inserted in the well instead of nitrogen gas to displace the water. The PVC slug is solid with a ½-inch hole drilled down its center, allowing the use of a pressure transducer for measuring and recording water levels. The slug and test apparatus for this method are shown on Figure TM-3-3.

Procedure

The test procedure generally consists of the following steps. First, the well head assembly and transducer equipment are set up at the well location. The test equipment, including the PVC slug is then lowered into the water and the water level within the well is then allowed to stabilize. Once the water level has stabilized, the slug is quickly removed from

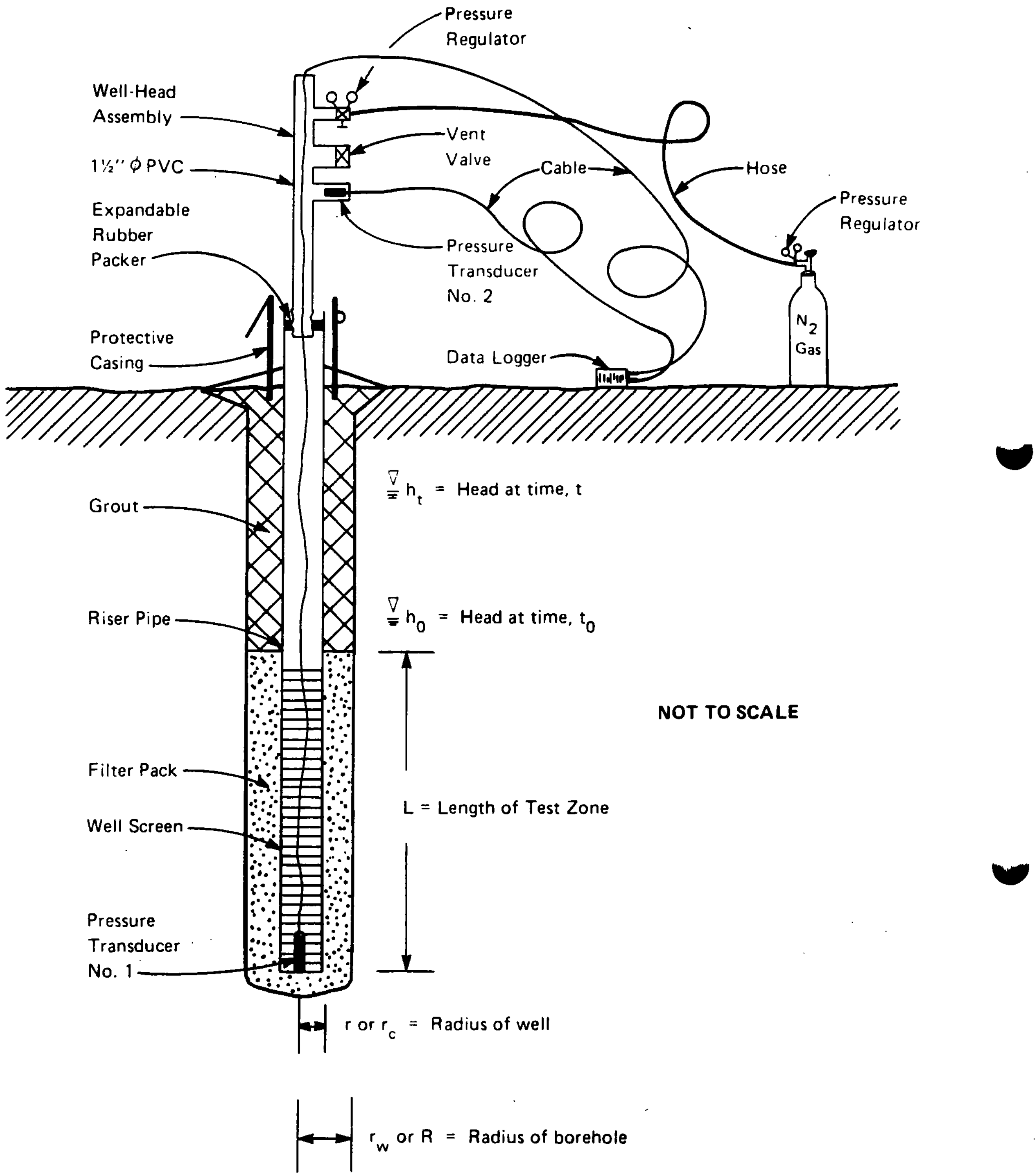


FIGURE TM-3-2
SCHEMATIC DIAGRAM OF
NITROGEN SLUG TEST ASSEMBLY
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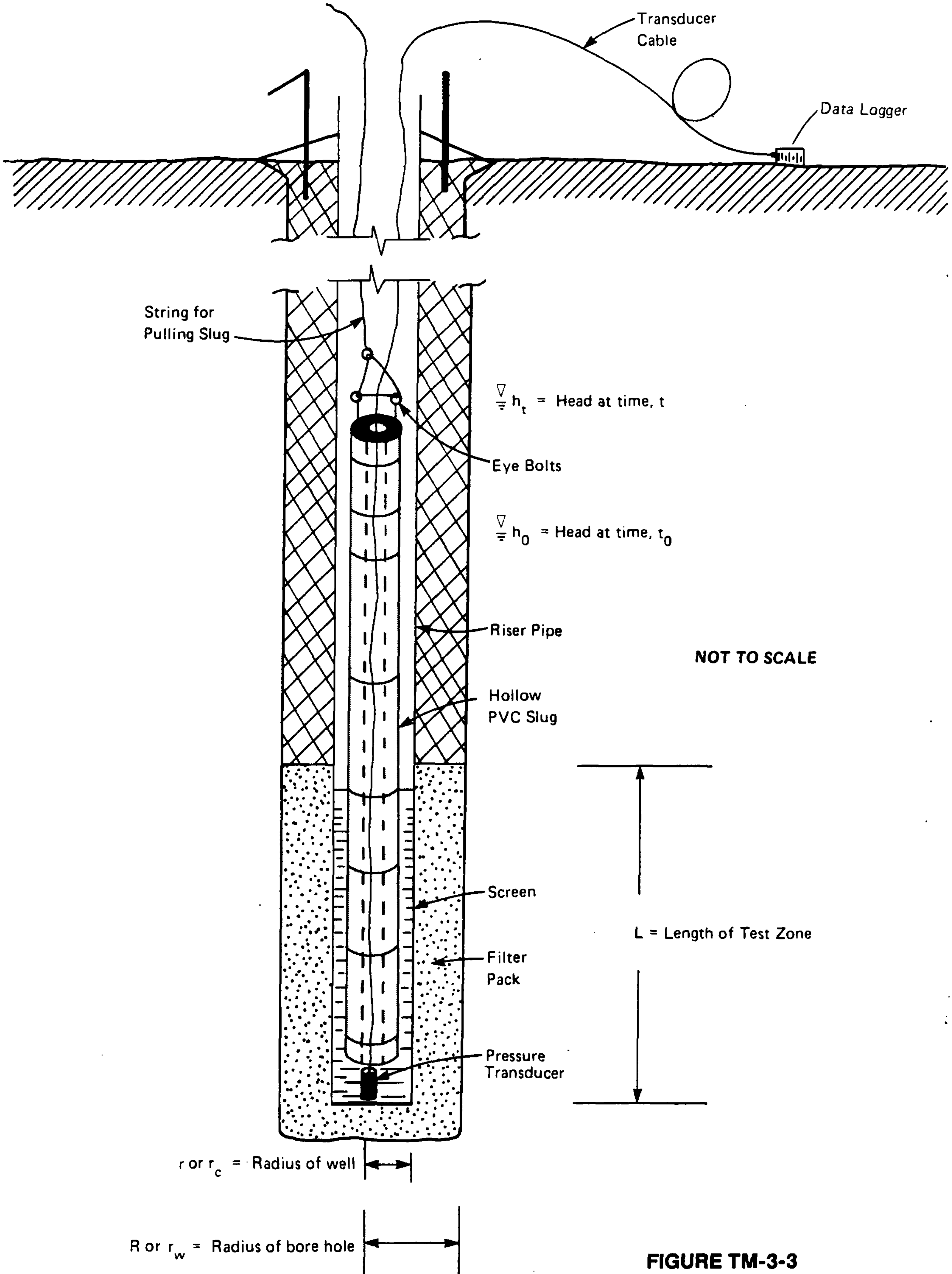

FIGURE TM-3-3
PVC SLUG TEST ASSEMBLY
NSL / ECC TECHNICAL MEMORANDUM NO. 3

the well, displacing a known volume from the well. The data logger is then used to record the rate at which the water level within the well recovers.

METHOD OF ANALYSIS

Tests were evaluated using the Bouwer and Rice method. The method was corrected when necessary to adjust the well radius to account for a porosity change associated with the sand pack when the water level is changing within the screened portion of the well. This correction was performed on data obtained from monitoring Well No. ECCMW13, which was the only well with water levels occurring below the top of the screened interval. The following sections describe the test and data reduction methods used at the ECC site.

BOUWER AND RICE METHOD

This method is described by Bouwer and Rice (1976). The equation for estimating hydraulic conductivity is:

$$K = \frac{rc^2 \times \ln(Re/rw) \times \ln(yo/yt)}{2 \times L \times t}$$

where,

K	=	hydraulic conductivity [L/T]
L	=	length of test zone [L]
t	=	time measured from start of test [T]
yo	=	initial head difference [L]
yt	=	head difference at time t [L]
rc	=	well radius, [L] (corrected for porosity in the sand pack)
Re	=	effective radial distance over which the head (y) is dissipated [L]
rw	=	radius of the borehole [L]

The value of the term ln (Re/Rw) is determined graphically using several curves for empirical constants given by Bouwer and Rice (1976, p. 426).

RESULTS

Test results of hydraulic conductivities calculated using the Bouwer and Rice method are summarized in Table TM-3-1. Graphical presentations of the test data (feet of water in well versus time) along with determined hydraulic conductivities for this method are

Table TM-3-1
RESULTS OF VARIABLE HEAD TESTING

Well I.D.	Test 1 (cm/s)	Test 2 (cm/s)	Test 3 (cm/s)	Log Average (cm/s)
ECCMW13	6.1×10^{-3}	7.9×10^{-3}	6.7×10^{-3}	6.9×10^{-3}
ECCMW14	5.4×10^{-2}	5.6×10^{-2}	5.6×10^{-2}	5.5×10^{-2}
ECCMW15	3.5×10^{-2}	3.2×10^{-2}	3.0×10^{-2}	3.2×10^{-2}
ECCMW16	6.3×10^{-3}	6.8×10^{-3}	6.9×10^{-3}	6.7×10^{-3}
ECCMW17	3.9×10^{-3}	9.2×10^{-3}	9.3×10^{-3}	9.1×10^{-3}
ECCMW18	1.1×10^{-2}	8.9×10^{-3}	8.5×10^{-3}	9.4×10^{-3}
ECCMW19B	2.5×10^{-4}	2.5×10^{-4}	3.0×10^{-4}	2.7×10^{-4}
ECCMW20	3.7×10^{-3}	3.2×10^{-3}	2.1×10^{-3}	2.9×10^{-3}
ECCMW21	4.1×10^{-2}	1.7×10^{-2}	1.5×10^{-2}	2.2×10^{-2}
ECCMW22	3.6×10^{-2}	2.8×10^{-3}	2.6×10^{-3}	2.9×10^{-3}
ECCMW23	3.0×10^{-4}	1.9×10^{-4}	2.5×10^{-4}	2.4×10^{-4}

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presented in Attachment TM-3-1. Raw data and data reduction notes have been retained in the ECC project files. Calculated values of hydraulic conductivity indicate an average range from 2.4×10^{-4} cm/s to 5.5×10^{-2} cm/s. A logarithmic average of the three test values at each well was calculated. A logarithmic average was used because, statistically, hydraulic conductivity values generally show a logarithmic distribution versus a normal distribution.

Data Limitations

The following assumptions are inherent in the theoretical development of the Bouwer and Rice equations for analyzing slug test data:

- Drawdown of the water table around the well is negligible.
- Flow in the unsaturated zone can be ignored.
- Well losses are negligible.
- The aquifer is homogeneous and isotropic.

Assumptions 1, 2, and 3 are probably satisfied at the site. Assumption 4, however, is satisfied neither locally nor site-wide. Because of this, each test individually is actually an average of the formation material in the immediate vicinity of each test location.

Additional limitations in performing variable head tests apply to Well No. ECCMW13, which was the only well with the water level occurring below the top of the screened interval. An assumption in the analysis is that the recovery is limited to within the well casing. Because the recovery in this instance takes place within the screened interval and the filter pack, the volume recovered per foot in the well is greater than that of the assumed well casing by the volume of the porosity of the filter pack. By correcting the volume of the well casing to incorporate both the volume of the screen (which is equal to that of the casing) and the porosity of the filter pack, the standard analysis can then be applied. As the well recovers, the effective screen length and the effective thickness of the aquifer change. These were not accounted for, nor do any corrections or methods of analyses exist in which they are accounted for. For this reason, the rising head data obtained from the wells in which the water table surface occurs below the top of the screened interval are less accurate than data obtained from wells in which the screened interval is entirely submerged.

CONCLUSIONS

An average hydraulic conductivity of 1 x 10^{-2} cm/s was assumed for the sand and gravel unit during feasibility study calculations. The assumed value falls within the range of values determined using slug testing on individual wells (2.4 x 10^{-4} cm/s to 5.5 x 10^{-2} cm/s). However, some of the determined values are almost two orders of magnitude lower than the previously assumed values. The hydraulic conductivity in the unit probably varies across the determined range within the unit. The range of hydraulic conductivity values should be considered for future estimations of groundwater pumping/collection from this unit.

REFERENCES

Bouwer, Herman, and R. C. Rice. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells. *Water Resources Research* 12 (1976): 423-28.

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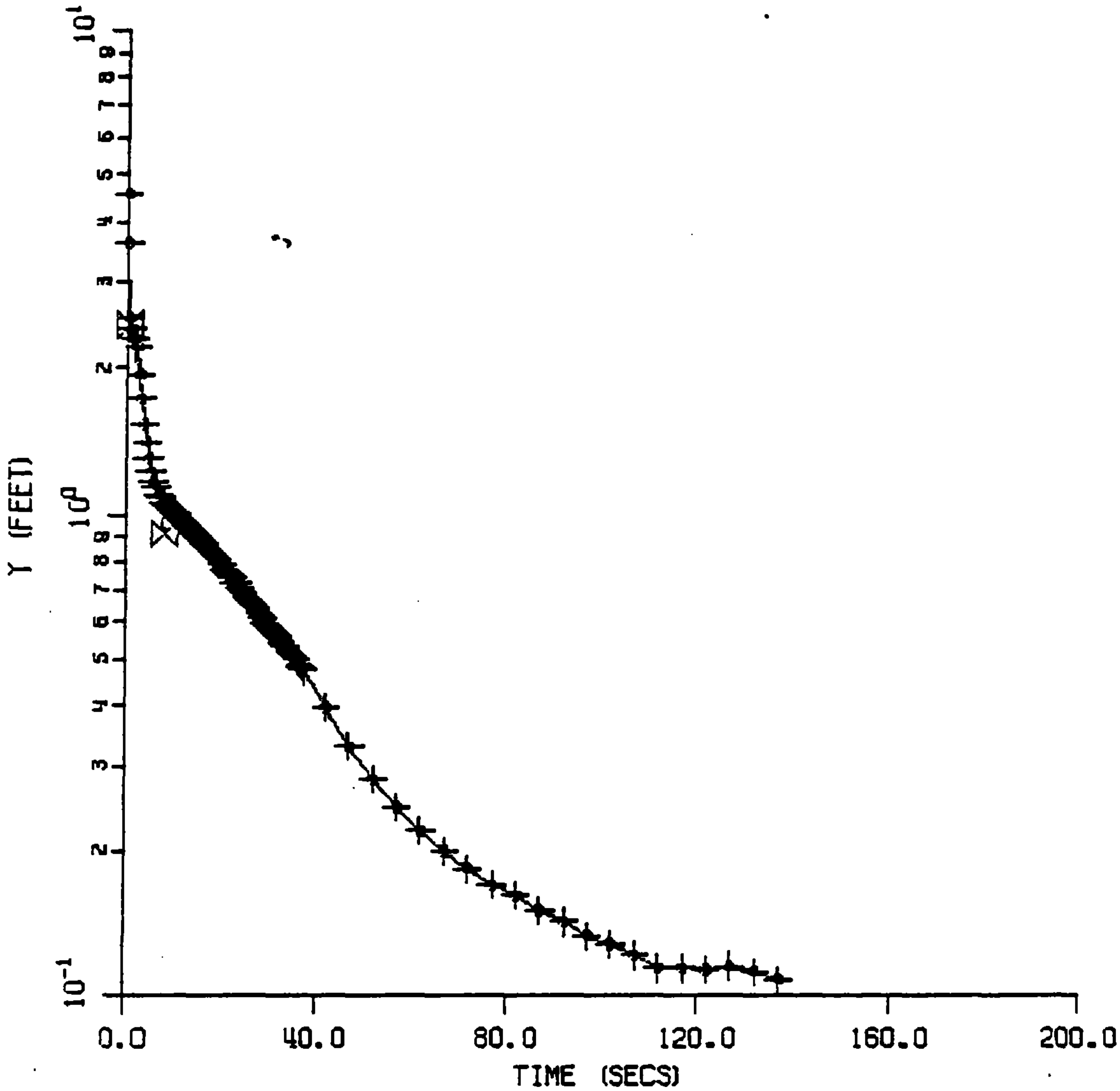
Attachment TM3-1
GRAPHICAL PRESENTATIONS OF TEST DATA

NSL/ECC
ECCMW13 TEST 1



K (CM/S) = 0.006162

WELL SPECS. (FEET)

SCREEN LENGTH = 8.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 8.0

COEFFICIENTS

A = 0.0

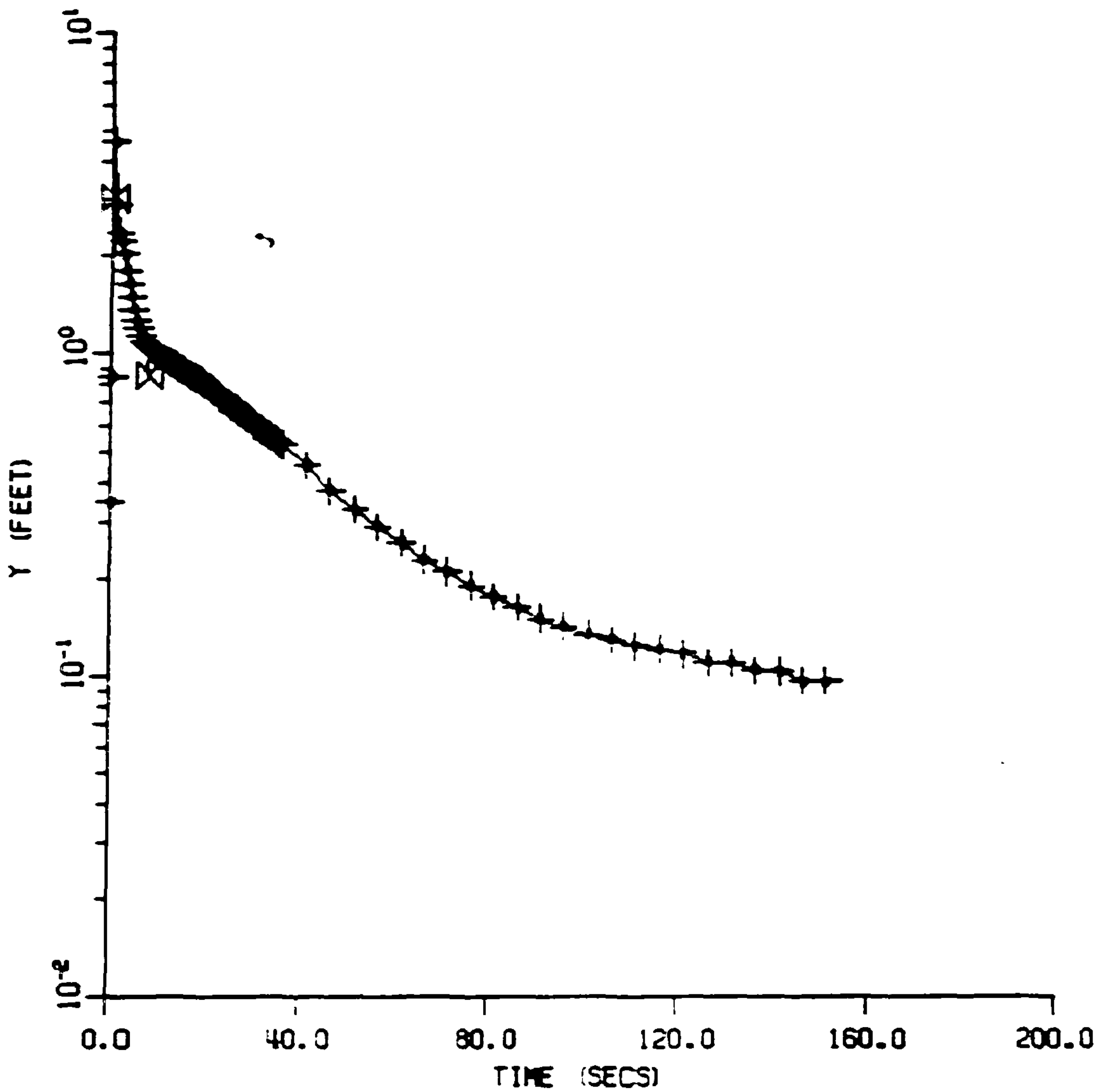
B = 0.0

C = 4.0

Y-INTERCEPT = 2.6

SLOPE = -0.1

NSL/ECC
ECCMW13 TEST 2



K (CM/S) = 0.007947

WELL SPECS. (FEET)

SCREEN LENGTH = 8.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 8.0

COEFFICIENTS

A = 0.0

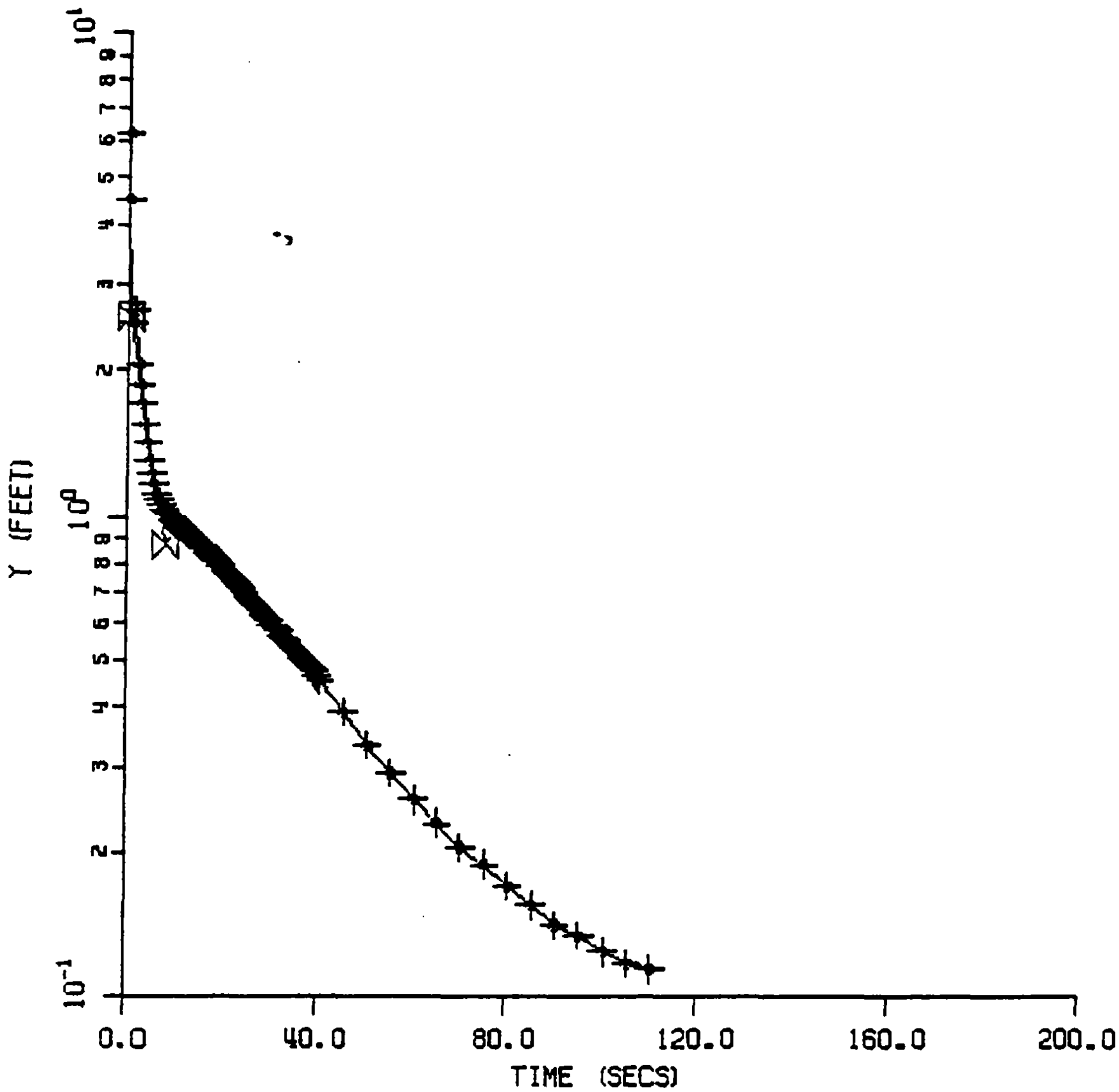
B = 0.0

C = 4.0

Y-INTERCEPT = 3.3

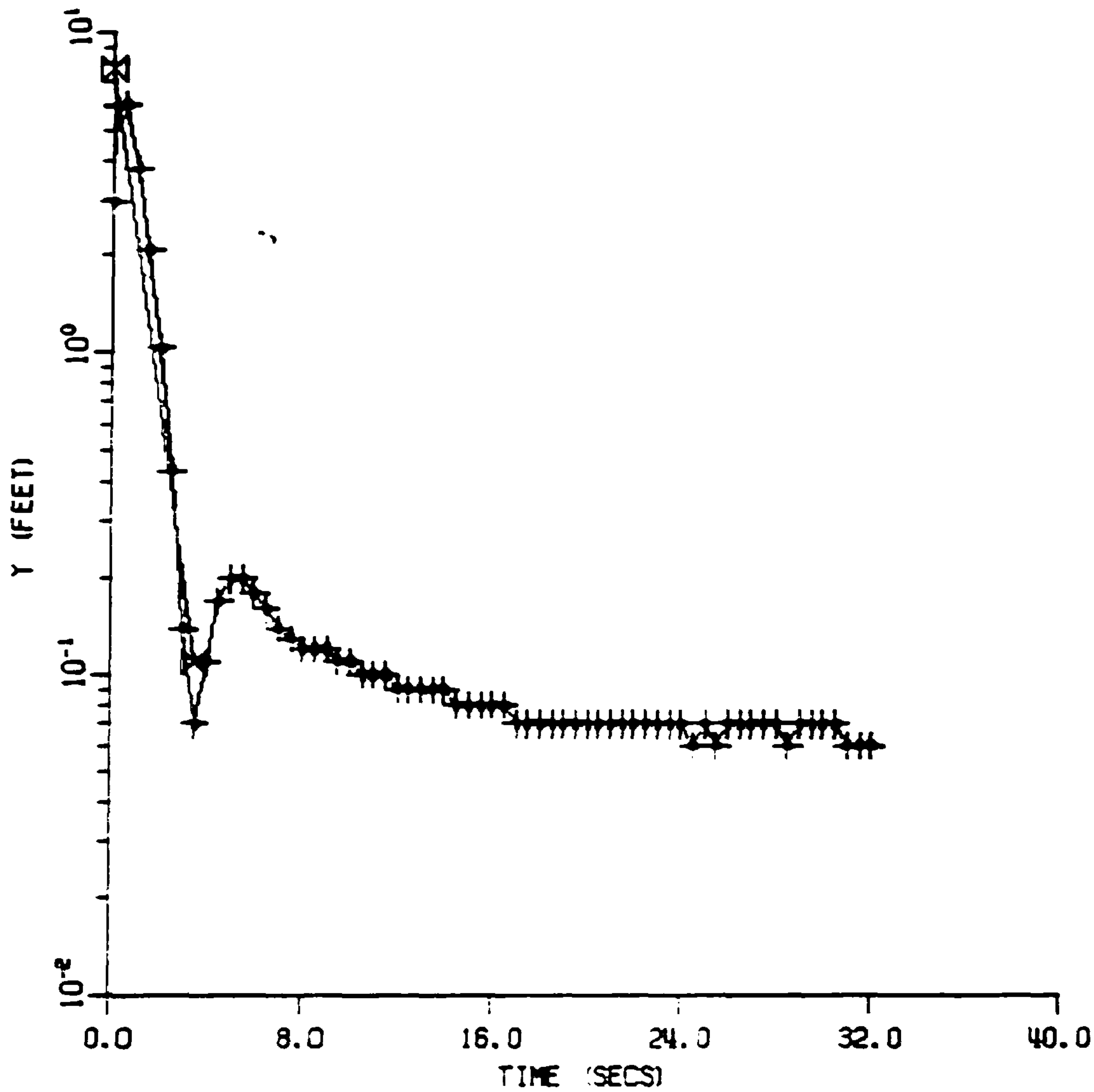
SLOPE = -0.1

NSL/ECC
ECCMW13 TEST 3



K (CM/S) = 0.006710	COEFFICIENTS
WELL SPECS. (FEET)	A = 0.0
SCREEN LENGTH = 8.0	B = 0.0
WELL SCREEN/BORE RADIUS = 0.1	C = 4.0
WELL CASING RADIUS = 0.1	Y-INTERCEPT = 2.8
AQUIFER THICKNESS = 8.0	SLOPE = -0.1

NSL/ECC
ECCMW14 TEST 1



K (CM/S) = 0.054355

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 14.0

COEFFICIENTS

A = 0.0

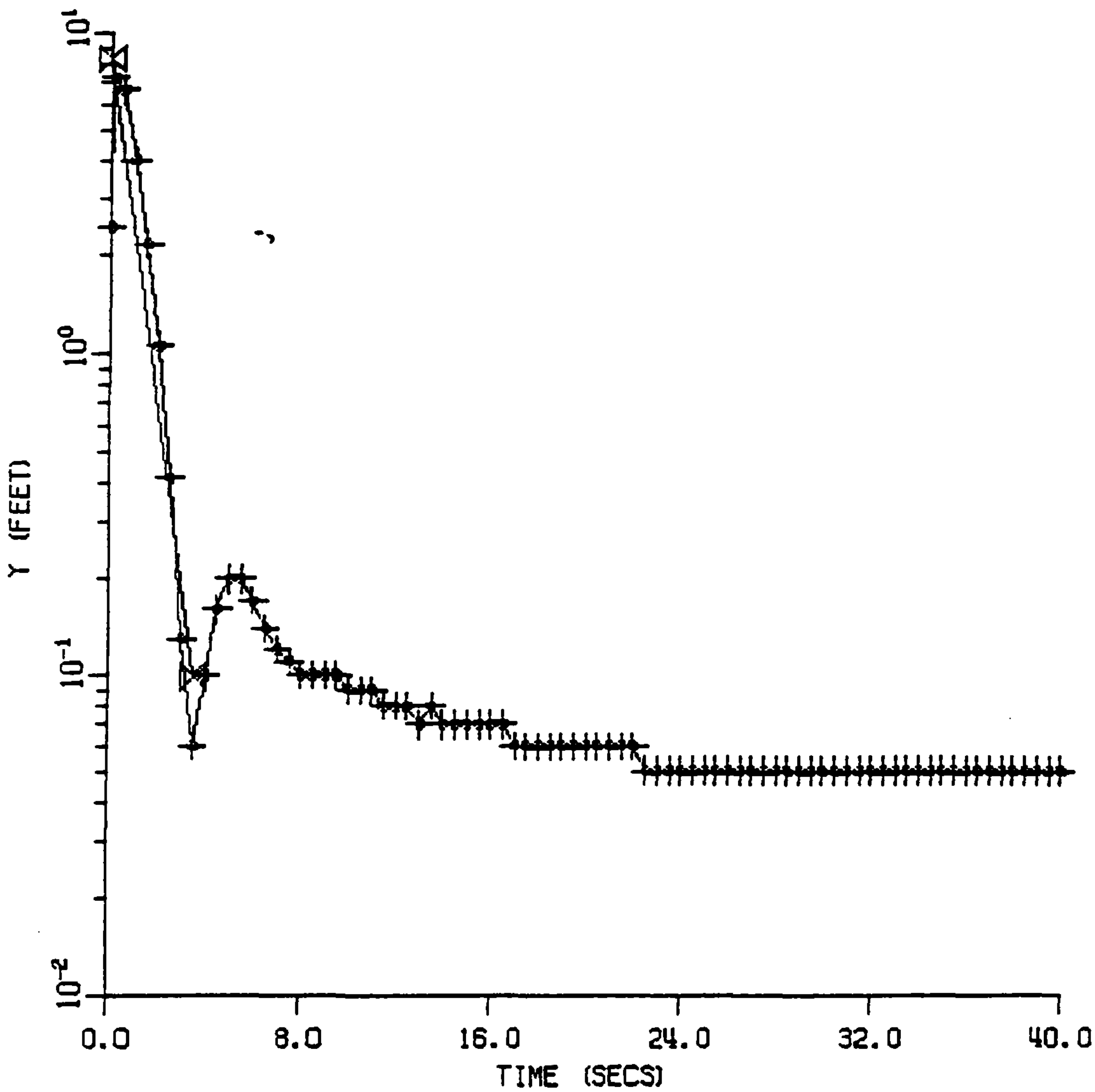
B = 0.0

C = 4.7

Y-INTERCEPT = 7.8

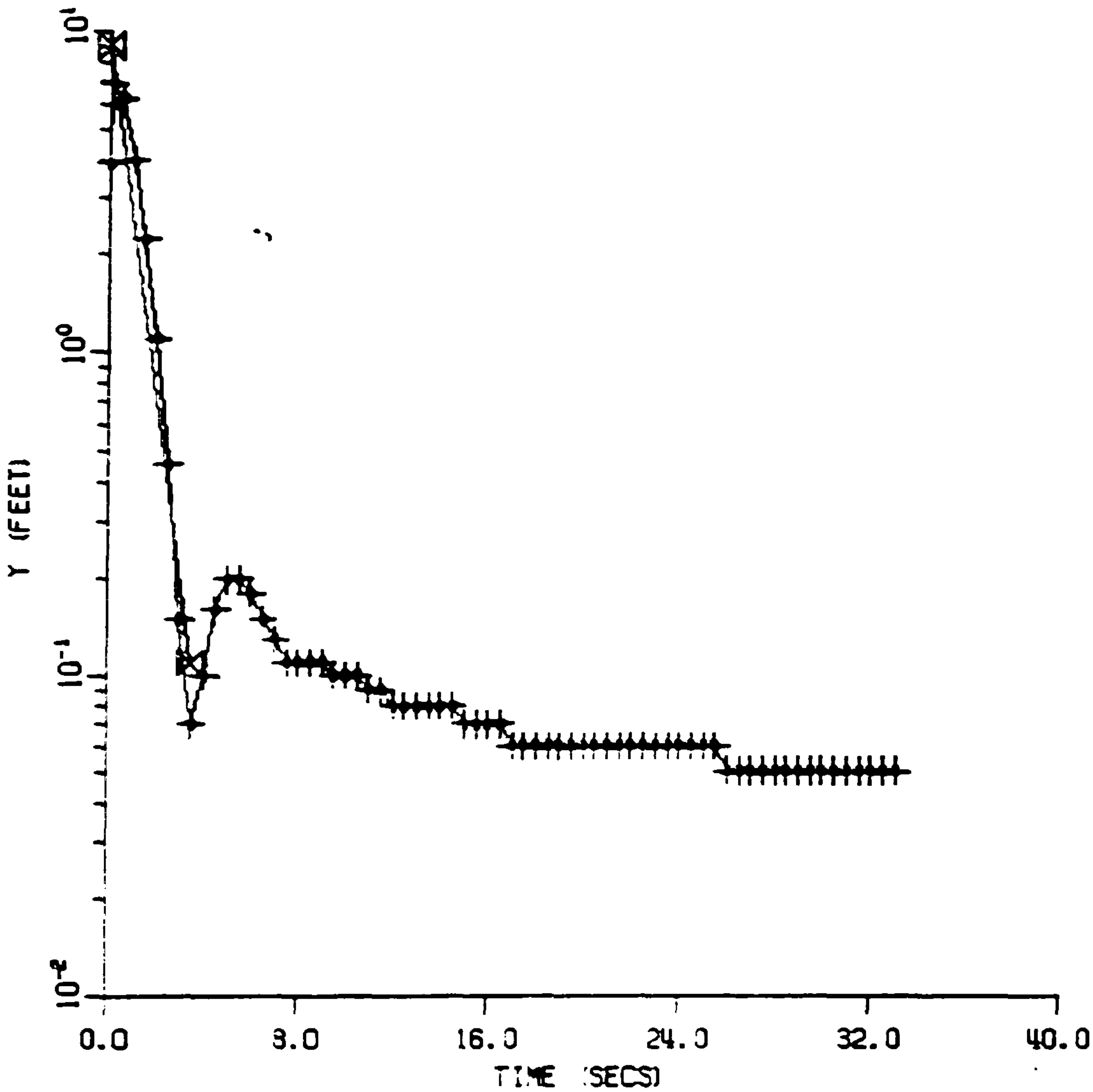
SLOPE = -0.5

NSL/ECC
ECCMW14 TEST 2



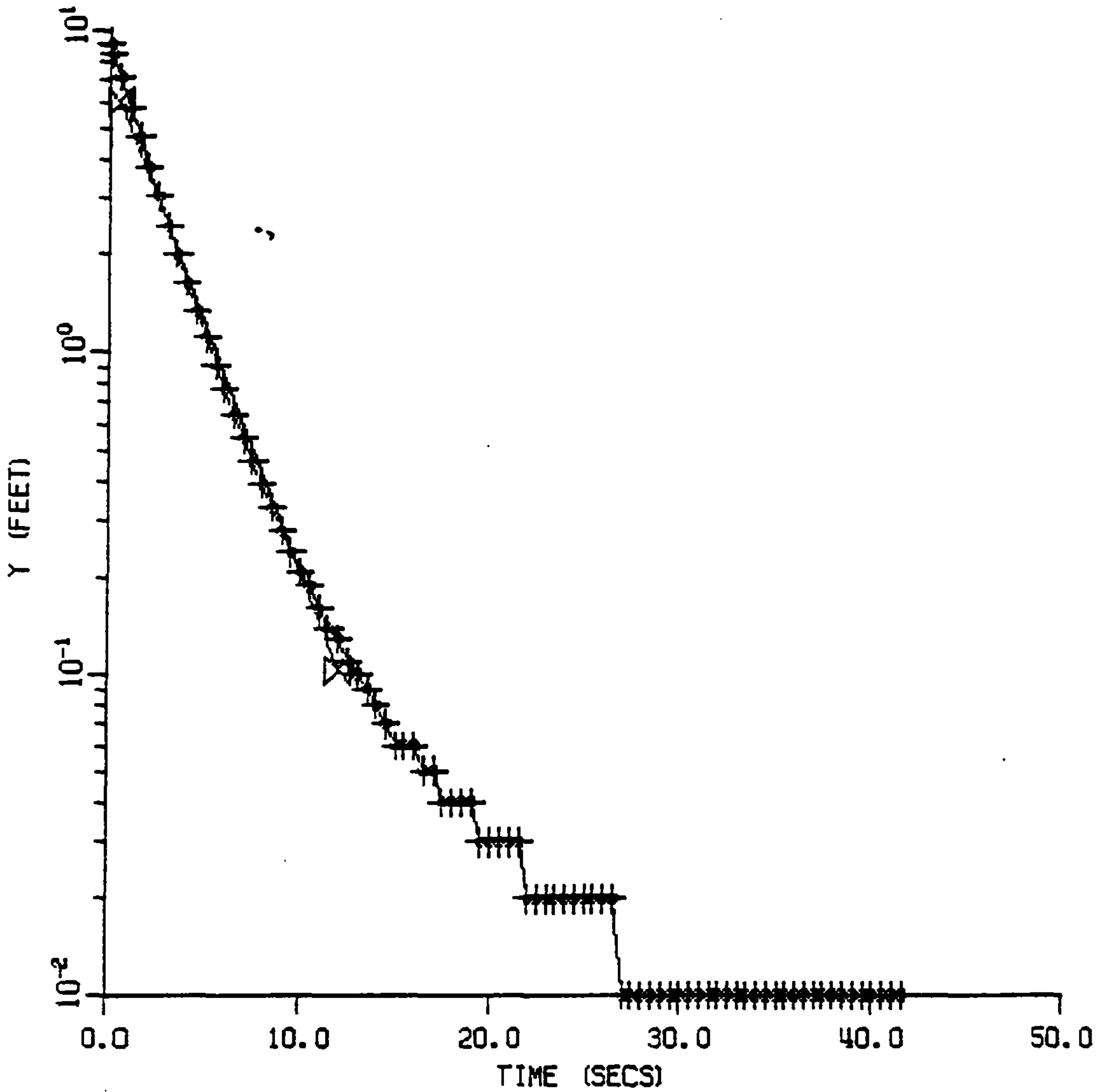
K (CM/S) = 0.056491	COEFFICIENTS
WELL SPECS. (FEET)	A = 0.0
SCREEN LENGTH = 10.0	B = 0.0
WELL SCREEN/BORE RADIUS = 0.1	C = 4.7
WELL CASING RADIUS = 0.1	Y-INTERCEPT = 8.3
AQUIFER THICKNESS = 14.0	SLOPE = -0.5

ECC/NSL
ECCMW14 TEST 3



K (CM/S) = 0.056331	COEFFICIENTS
WELL SPECS. (FEET)	A = 0.0
SCREEN LENGTH = 10.0	B = 0.0
WELL SCREEN/BORE RADIUS = 0.1	C = 4.7
WELL CASING RADIUS = 0.1	Y-INTERCEPT = 9.1
AQUIFER THICKNESS = 14.0	SLOPE = -0.5

NSL/ECC
ECCMW15 TEST 1



K (CM/S) = 0.035543

WELL SPECS. (FEET)

SCREEN LENGTH = 4.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 4.0

COEFFICIENTS

A = 0.0

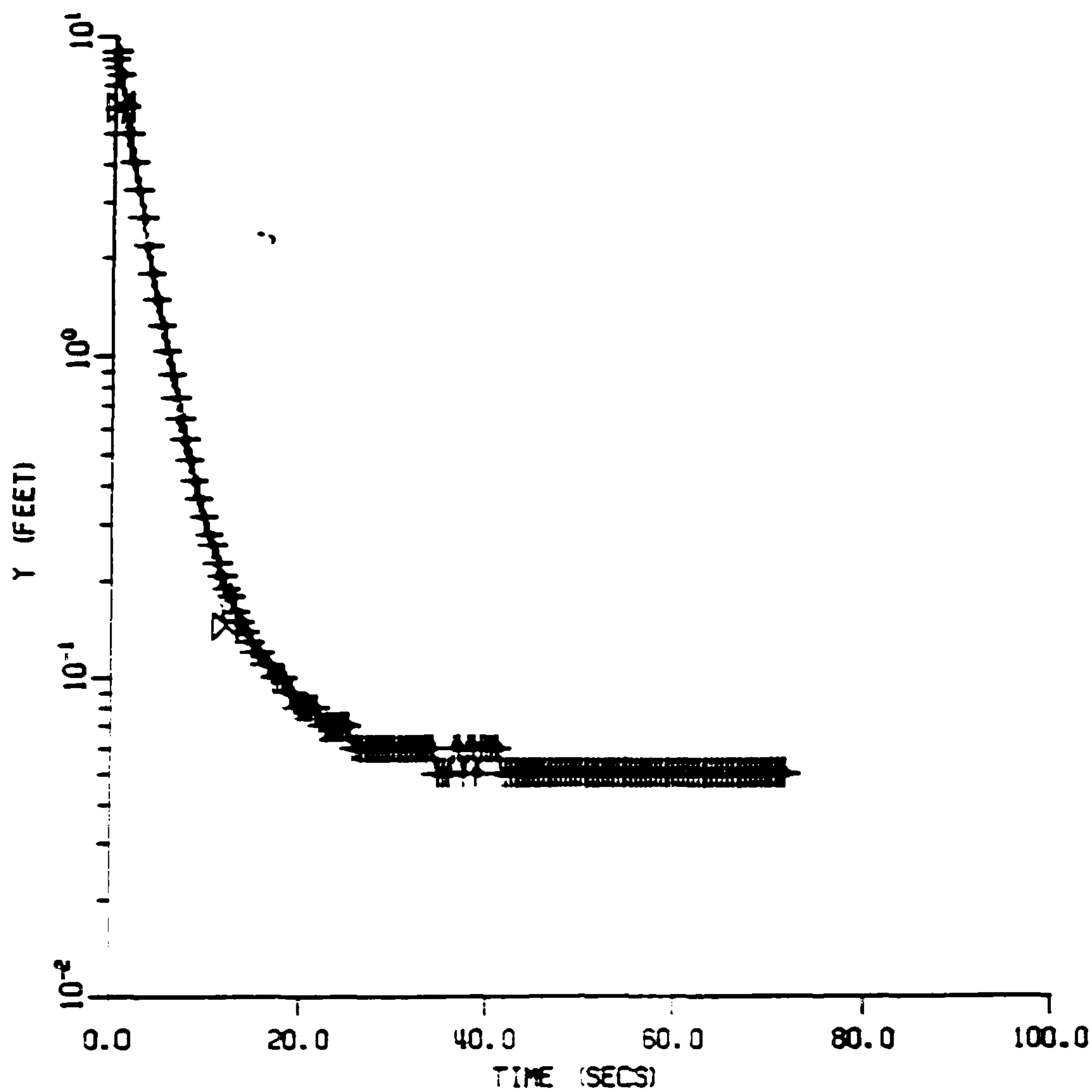
B = 0.0

C = 2.6

Y-INTERCEPT = 7.2

SLOPE = -0.2

NSL/ECC
ECCMW15 TEST 2



K (CM/S) = 0.032489

WELL SPECS. (FEET)

SCREEN LENGTH = 4.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 4.0

COEFFICIENTS

A = 0.0

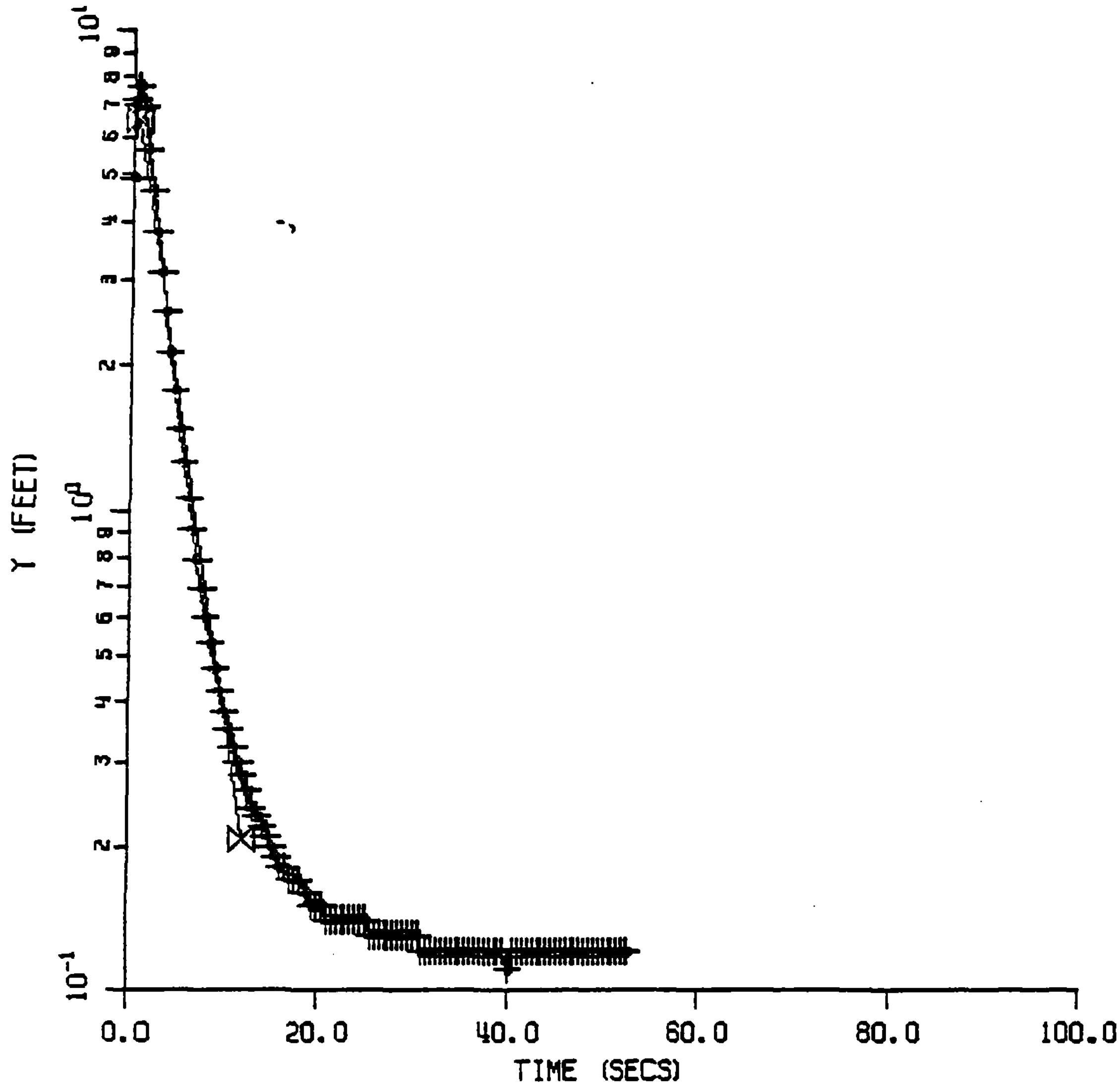
B = 0.0

C = 2.6

Y-INTERCEPT = 7.1

SLOPE = -0.1

NSL/ECC
ECCMW15 TEST 3



K (CM/S) = 0.030135

WELL SPECS. (FEET)

SCREEN LENGTH = 4.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 4.0

COEFFICIENTS

A = 0.0

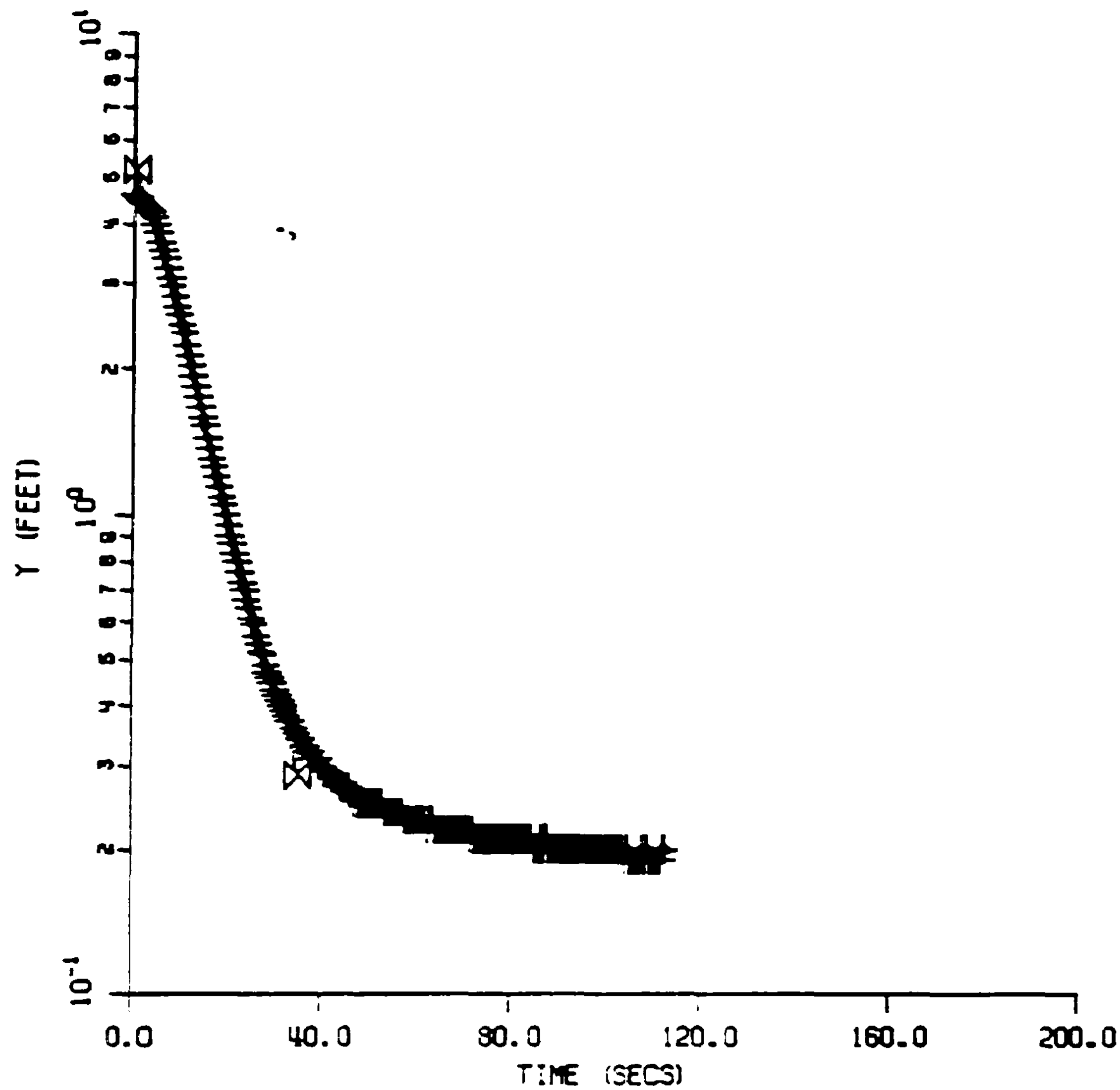
B = 0.0

C = 2.6

Y-INTERCEPT = 7.6

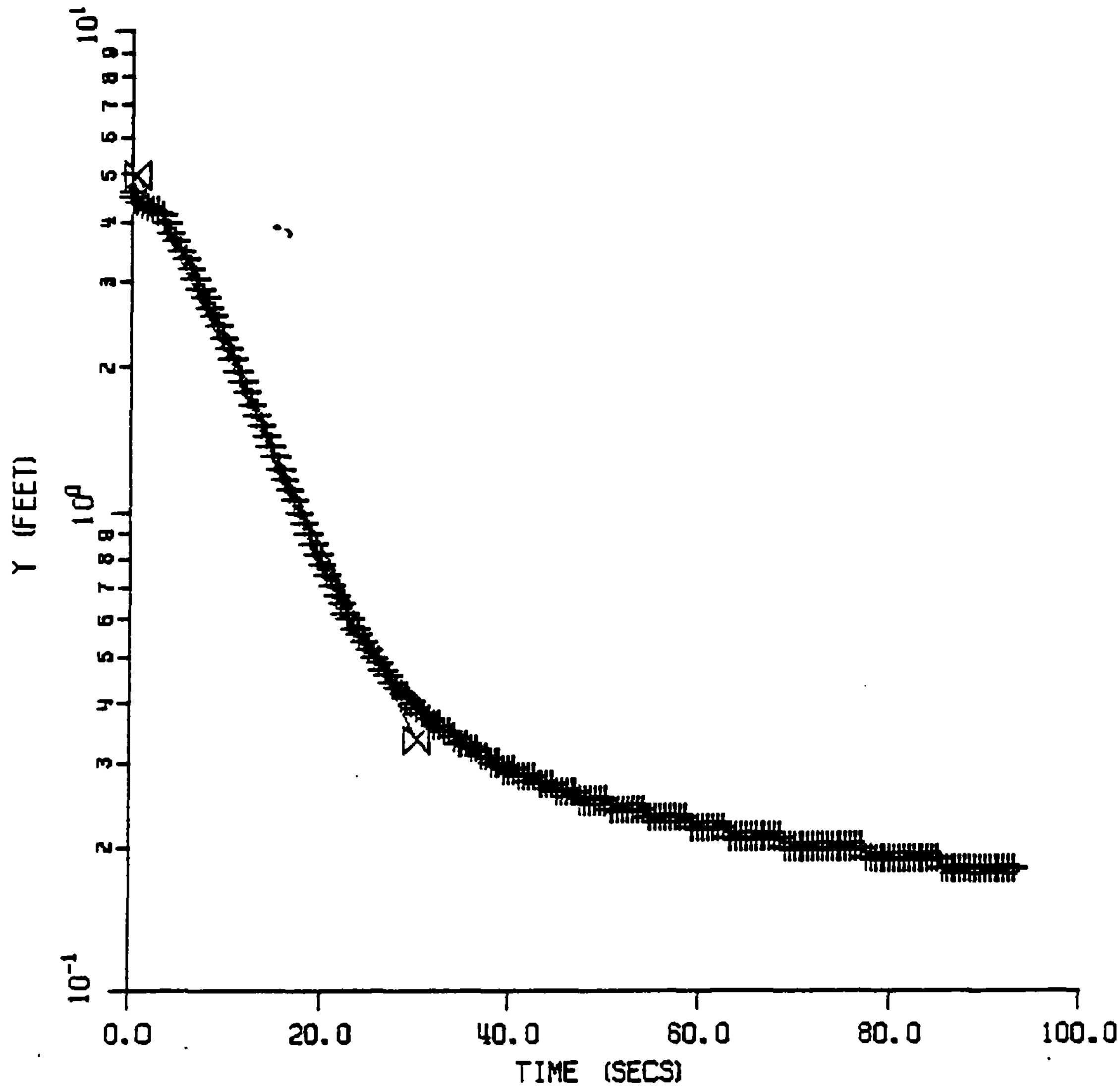
SLOPE = -0.1

NSL/ECC
ECCMW16 TEST 1



K (CM/S) = 0.006250	COEFFICIENTS
WELL SPECS. (FEET)	A = 0.0
SCREEN LENGTH = 5.0	B = 0.0
WELL SCREEN/BORE RADIUS = 0.1	C = 2.9
WELL CASING RADIUS = 0.1	Y-INTERCEPT = 5.4
AQUIFER THICKNESS = 6.0	SLOPE = -0.0

NSL/ECC
ECCMW16 TEST 2



K (CM/S) = 0.006806

WELL SPECS. (FEET)

SCREEN LENGTH = 5.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 6.0

COEFFICIENTS

A = 0.0

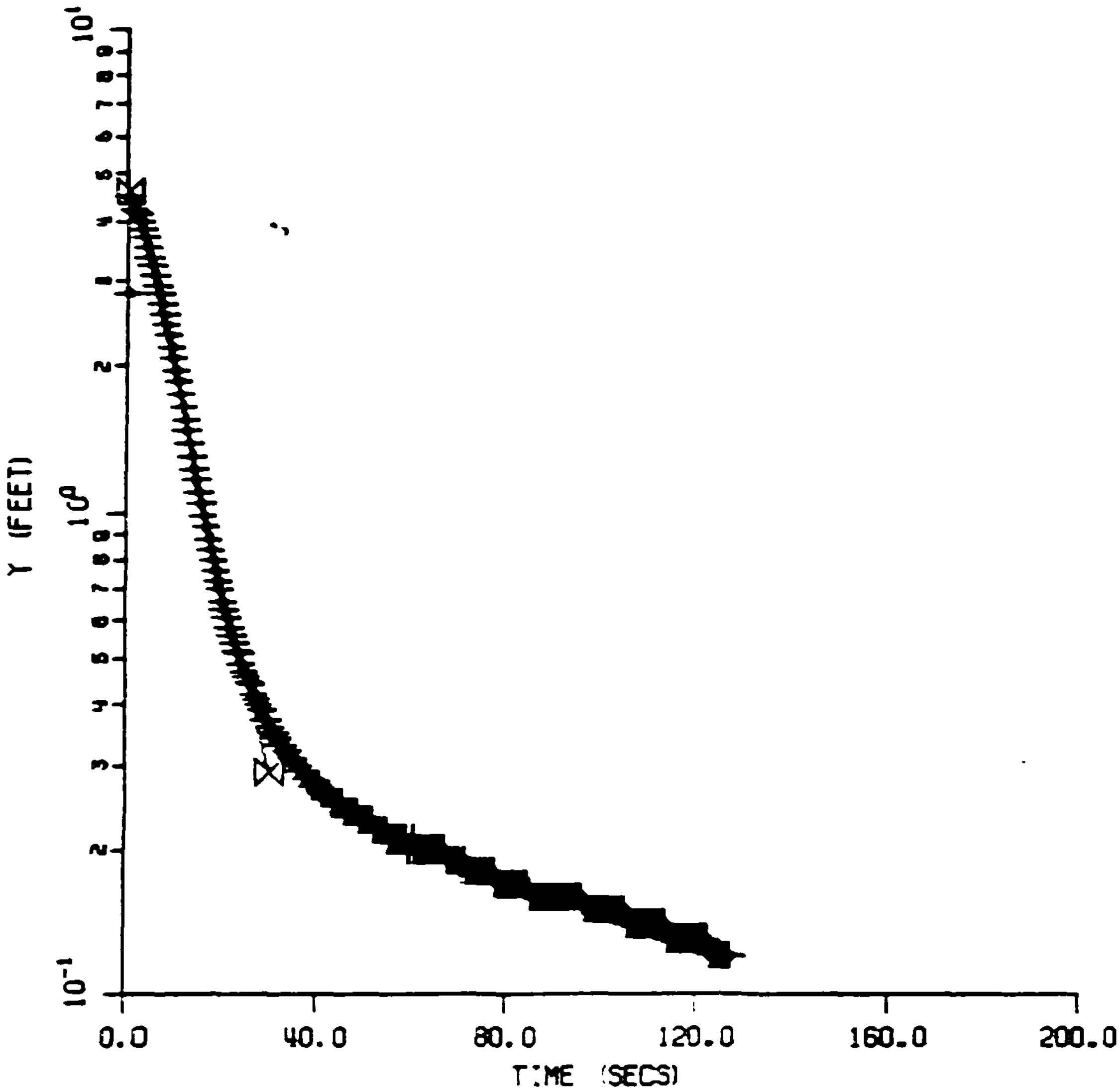
B = 0.0

C = 2.9

Y-INTERCEPT = 5.2

SLOPE = -0.0

NSL/ECC
ECCMW16 TEST 3



K (CM/S) = 0.006979

WELL SPECS. (FEET)

SCREEN LENGTH = 5.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 6.0

COEFFICIENTS

A = 0.0

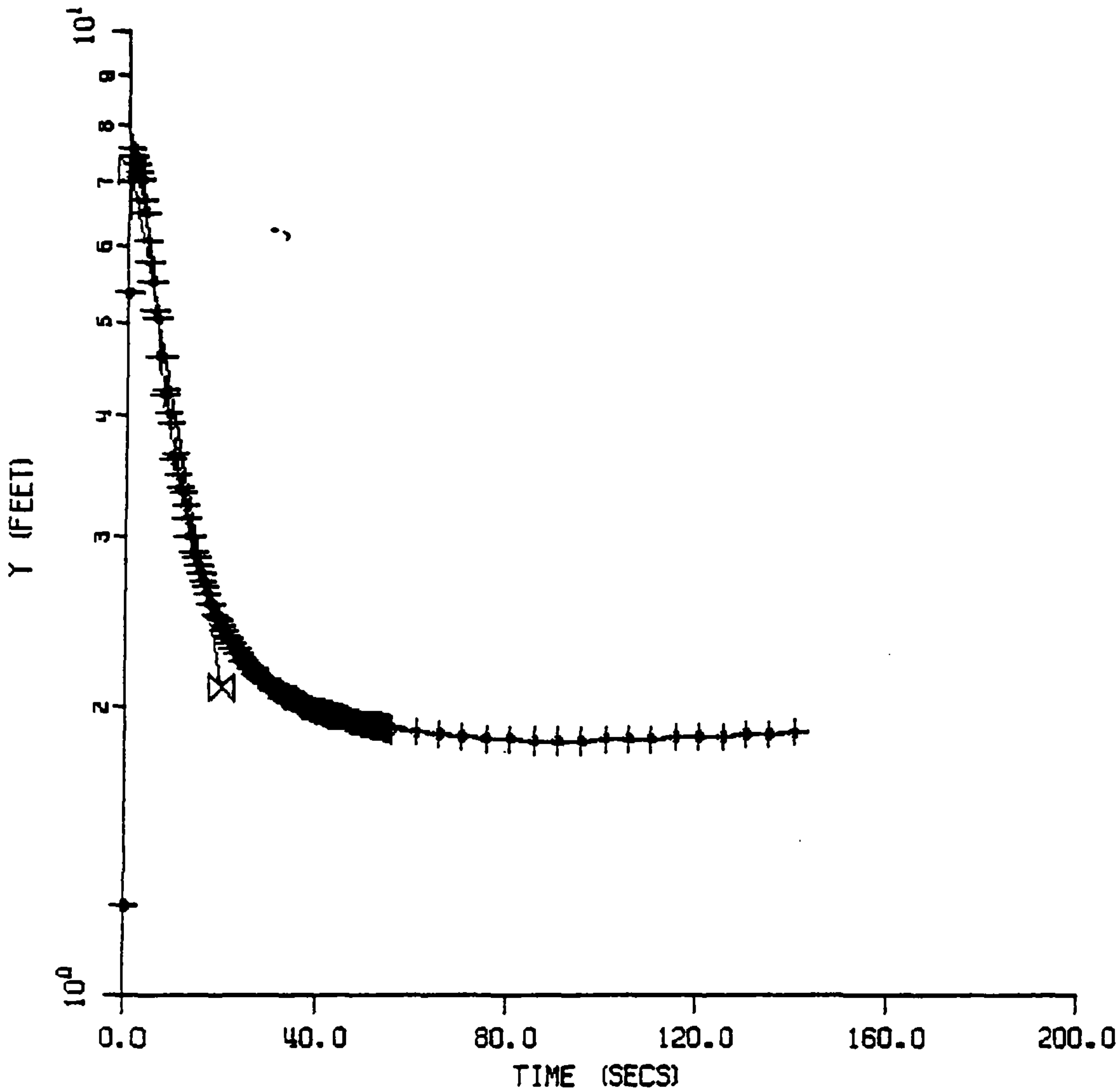
B = 0.0

C = 2.9

Y-INTERCEPT = 4.8

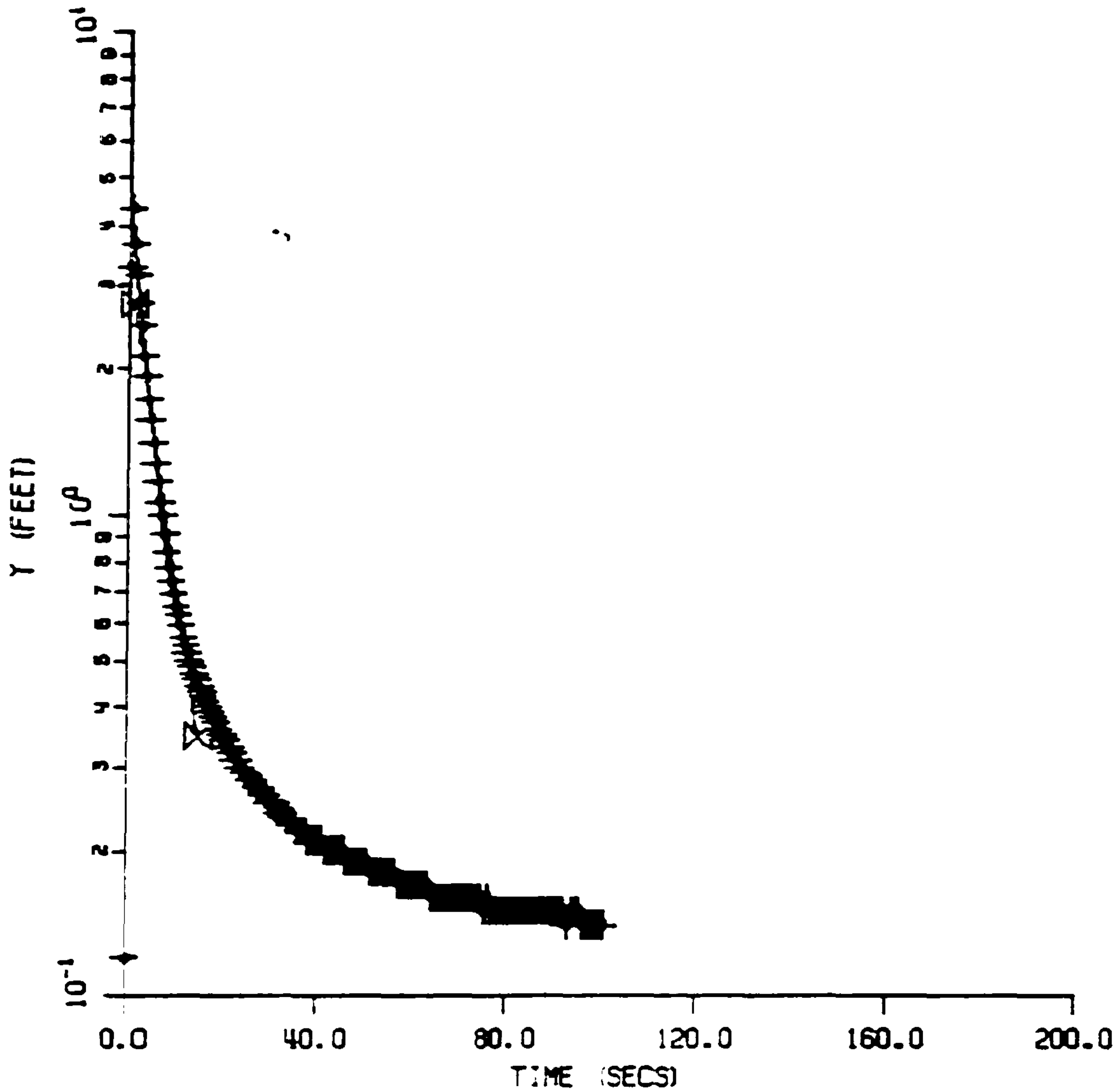
SLOPE = -0.0

NSL/ECC
ECCMW17 TEST 1



K (CM/S) = 0.003929	COEFFICIENTS
WELL SPECS. (FEET)	A = 0.0
SCREEN LENGTH = 4.0	B = 0.0
WELL SCREEN/BORE RADIUS = 0.3	C = 1.3
WELL CASING RADIUS = 0.1	Y-INTERCEPT = 7.4
AQUIFER THICKNESS = 4.0	SLOPE = -0.0

NSL/ECC
ECCMW17 TEST 2



K (CM/S) = 0.009152

WELL SPECS. (FEET)

SCREEN LENGTH = 4.0

WELL SCREEN/BORE RADIUS = 0.3

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 4.0

COEFFICIENTS

A = 0.0

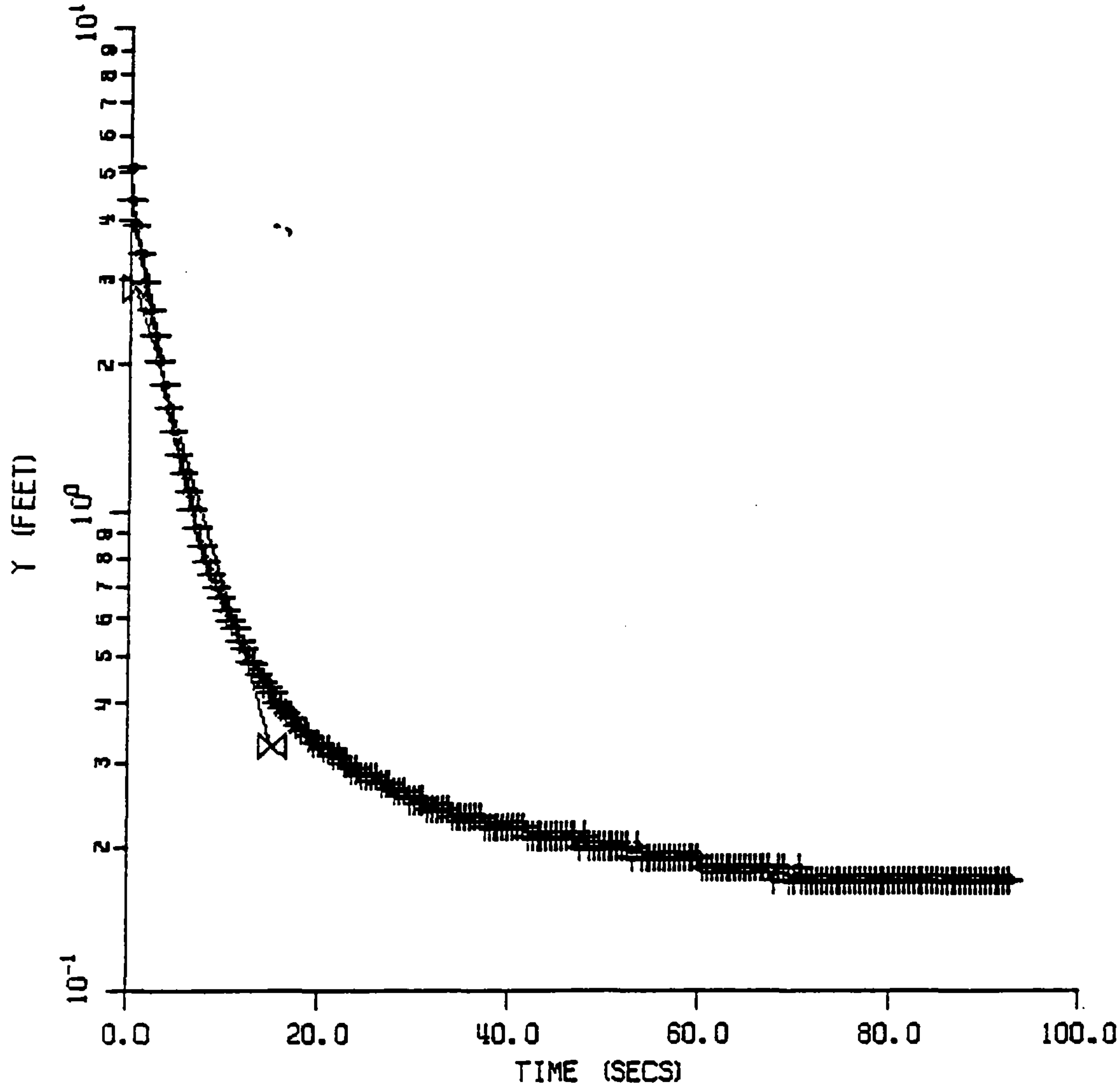
B = 0.0

C = 1.3

Y-INTERCEPT = 3.2

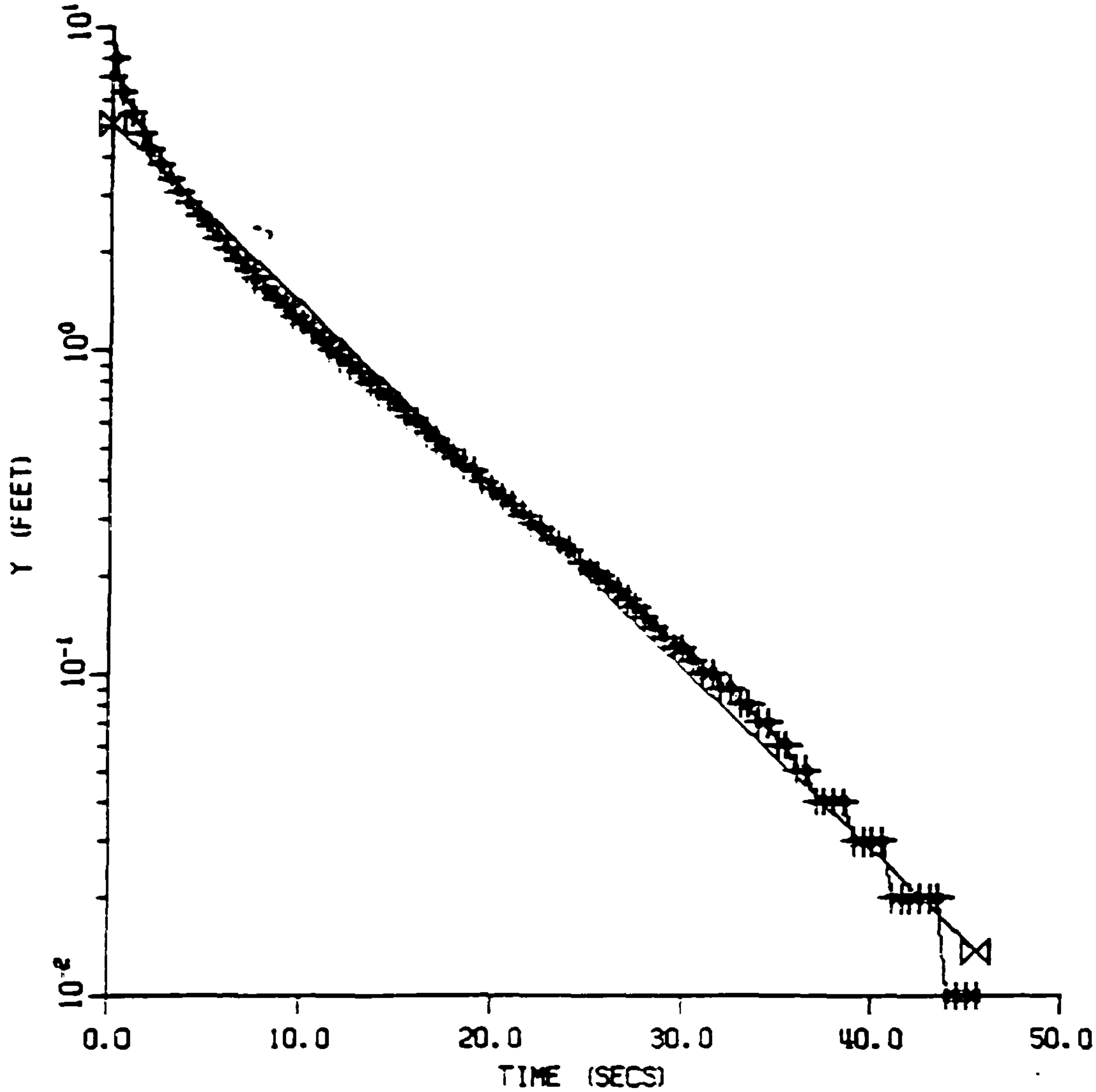
SLOPE = -0.1

NSL/ECC
ECCMW17 TEST 3



K (CM/S) = 0.009336	COEFFICIENTS
WELL SPECS. (FEET)	A = 0.0
SCREEN LENGTH = 4.0	B = 0.0
WELL SCREEN/BORE RADIUS = 0.3	C = 1.3
WELL CASING RADIUS = 0.1	Y-INTERCEPT = 3.1
AQUIFER THICKNESS = 4.0	SLOPE = -0.1

NSL/ECC
ECCMW18 TEST 1



K (CM/S) = 0.010601

WELL SPECS. (FEET)

SCREEN LENGTH = 5.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 7.0

COEFFICIENTS

A = 0.0

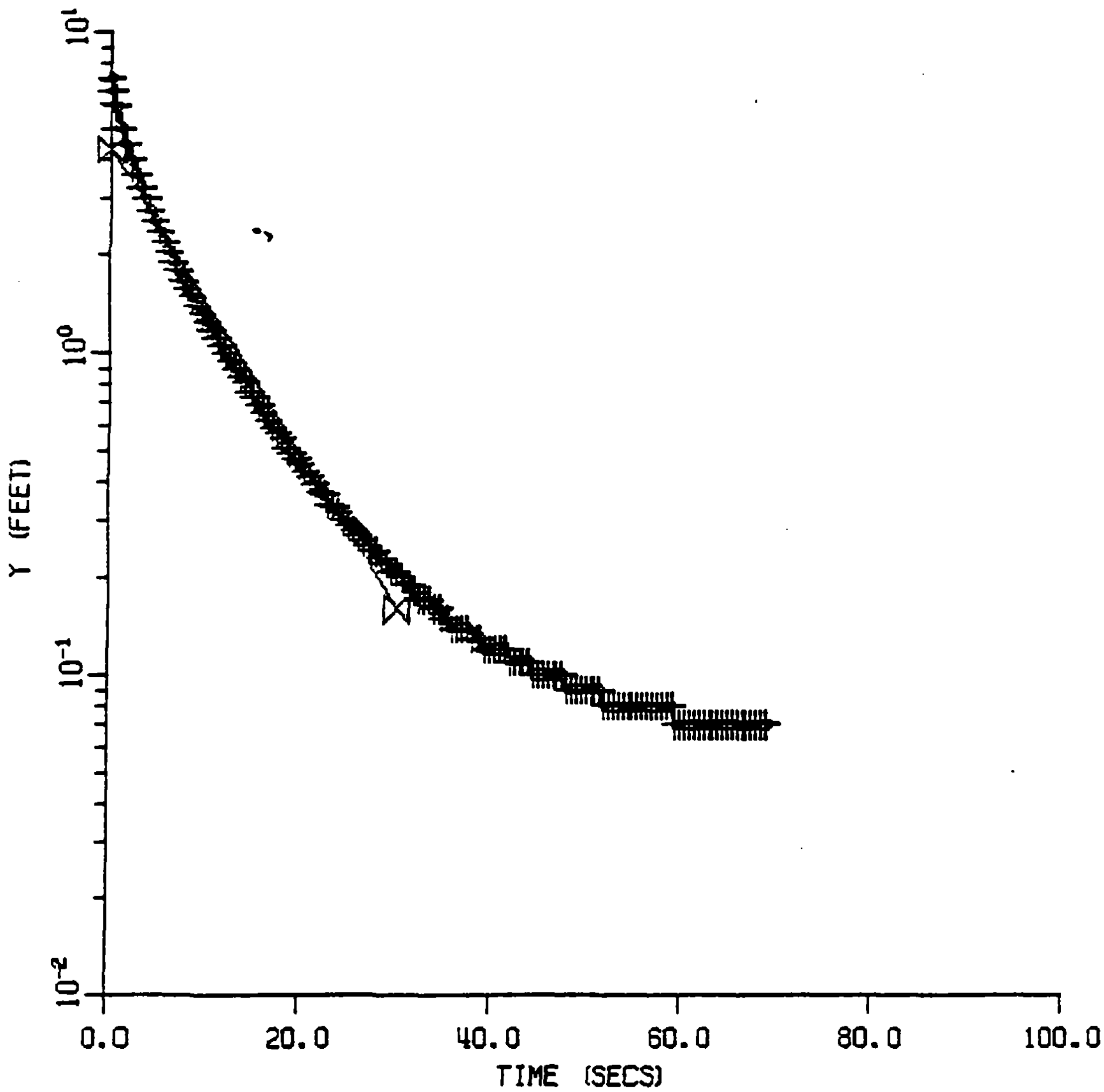
B = 0.0

C = 2.9

Y-INTERCEPT = 5.1

SLOPE = -0.1

NSL/ECC
ECCMW18 TEST 2



K (CM/S) = 0.008935

WELL SPECS. (FEET)

SCREEN LENGTH = 5.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 7.0

COEFFICIENTS

A = 0.0

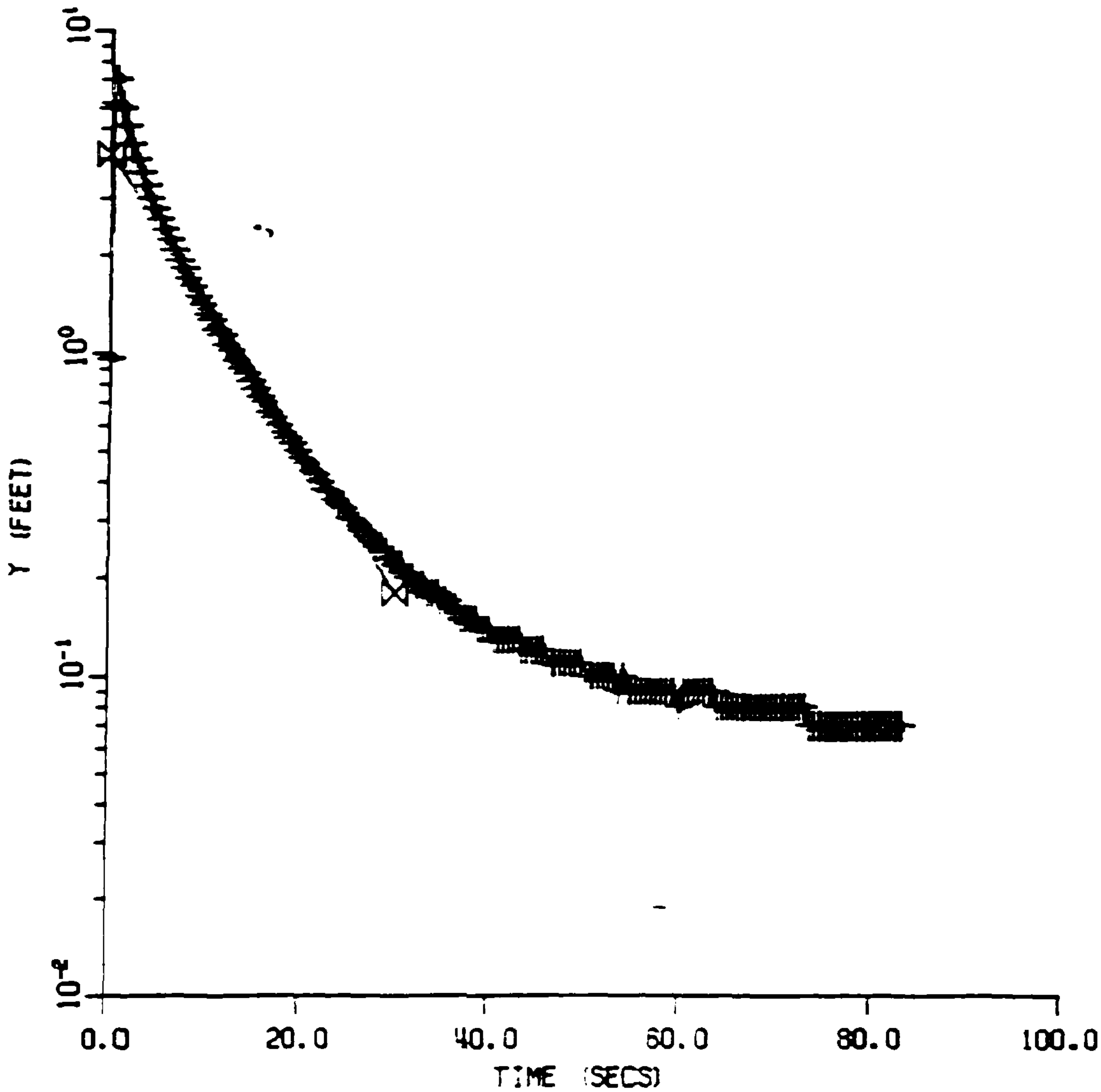
B = 0.0

C = 2.9

Y-INTERCEPT = 4.3

SLOPE = -0.0

NSL/ECC
ECCMW18 TEST 3



K (CM/S) = 0.008494

WELL SPECS. (FEET)

SCREEN LENGTH = 5.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 7.0

COEFFICIENTS

A = 0.0

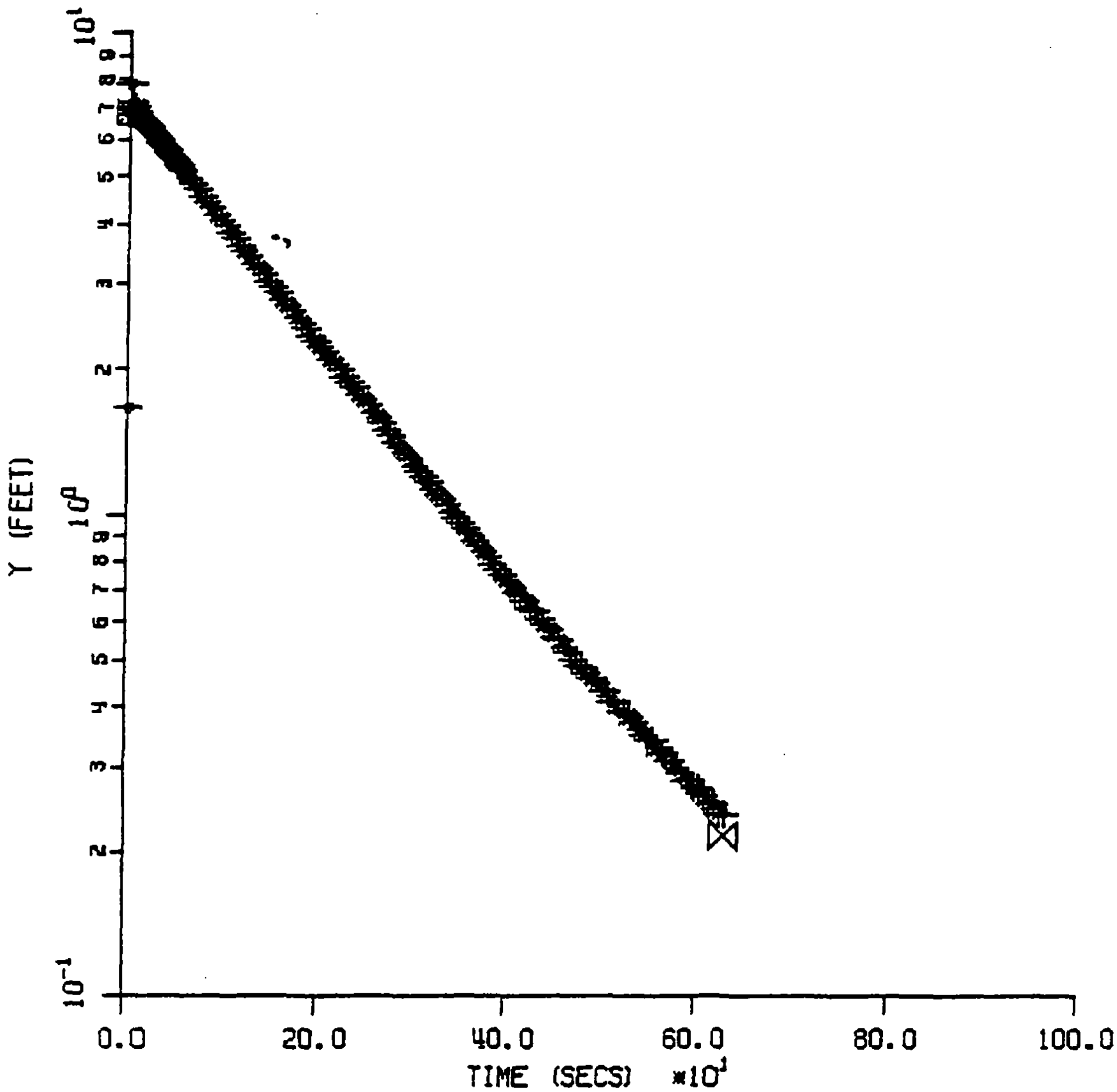
B = 0.0

C = 2.9

Y-INTERCEPT = 4.1

SLOPE = -0.0

NSL/ECC
ECCMW19B TEST 1



K (CM/S) = 0.000247

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 16.0

COEFFICIENTS

A = 0.0

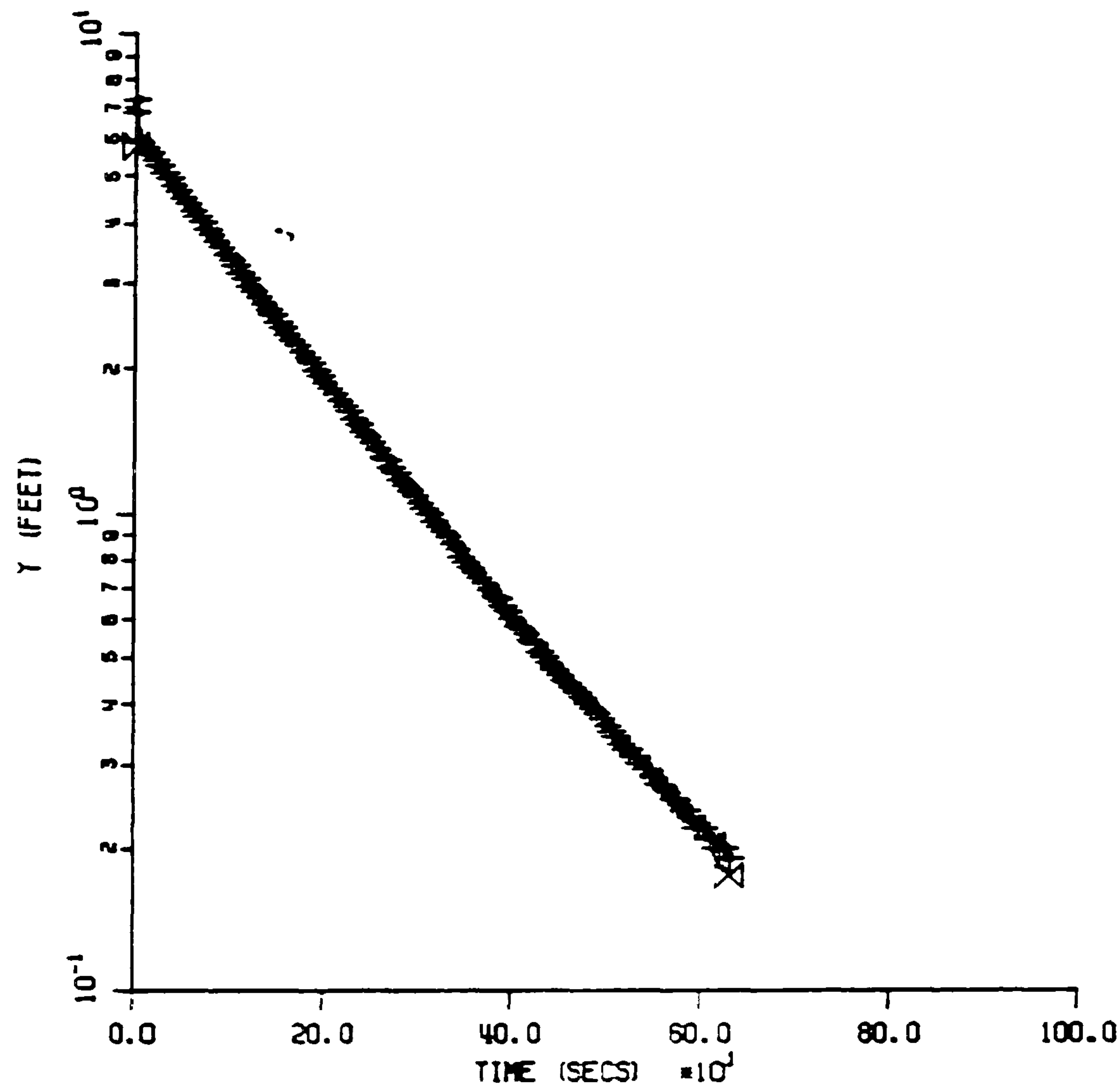
B = 0.0

C = 4.7

Y-INTERCEPT = 6.8

SLOPE = -0.0

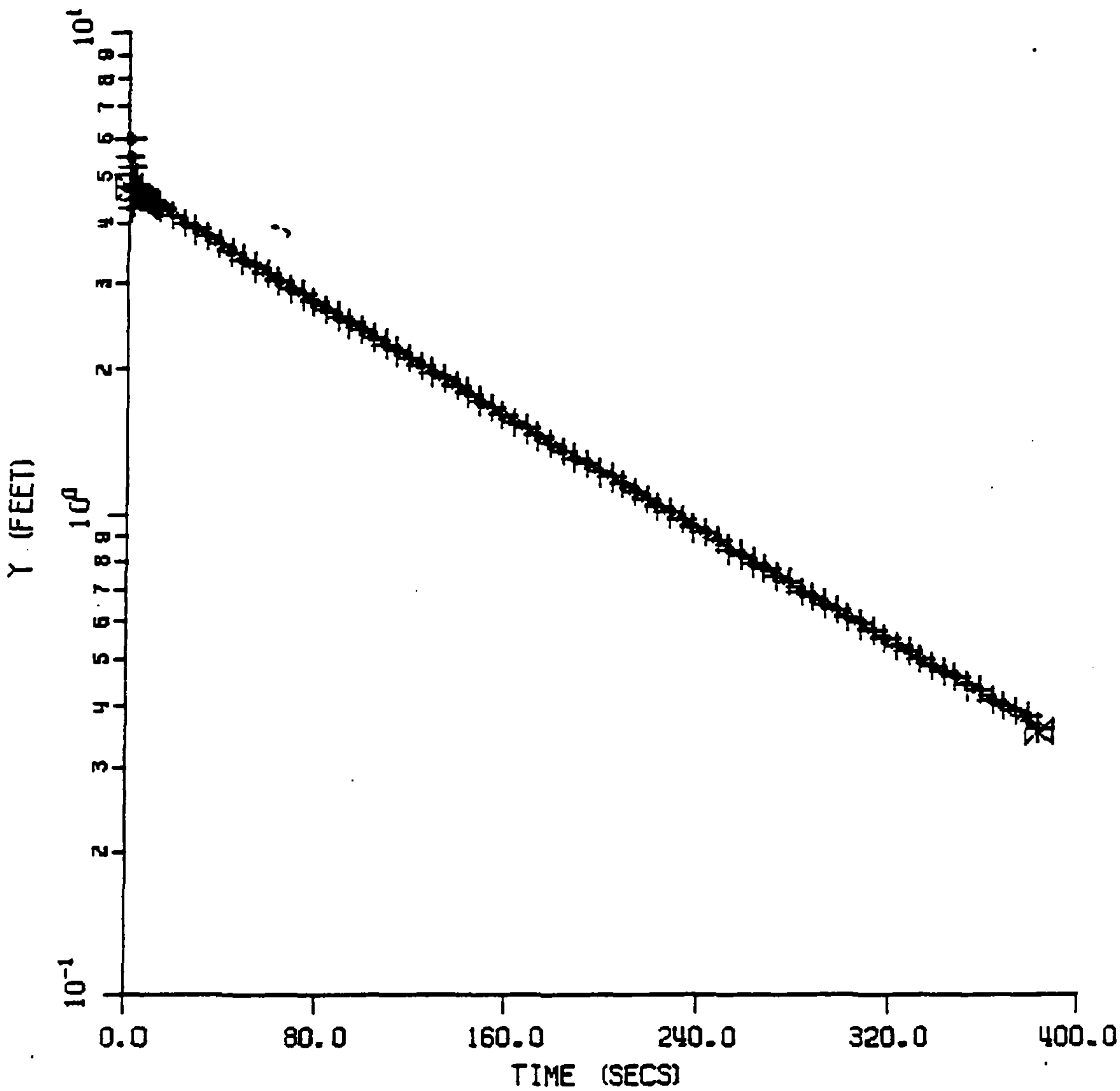
NSL/ECC
ECCMW19B TEST 2



K (CM/S) = 0.000250
WELL SPECS. (FEET)
SCREEN LENGTH = 10.0
WELL SCREEN/BORE RADIUS = 0.1
WELL CASING RADIUS = 0.1
AQUIFER THICKNESS = 16.0

COEFFICIENTS
A = 0.0
B = 0.0
C = 4.7
Y-INTERCEPT = 5.8
SLOPE = -0.0

NSL/ECC
ECCMW19B TEST 3



K (CM/S) = 0.000304

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 16.0

COEFFICIENTS

A = 0.0

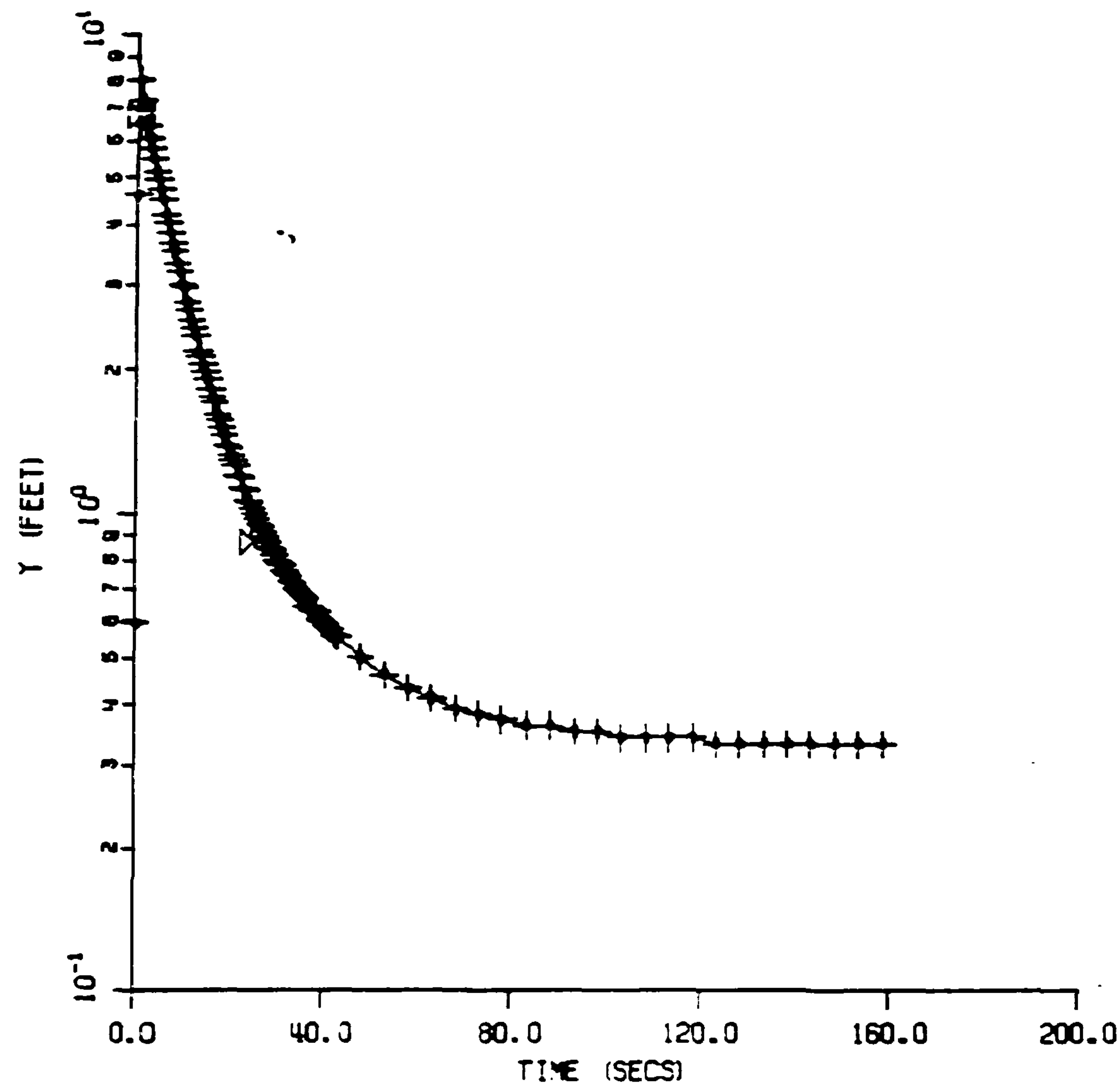
B = 0.0

C = 4.7

Y-INTERCEPT = 4.7

SLOPE = -0.0

NSL/ECC
ECCMW20 TEST 1



K (CM/S) = 0.003757

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 23.0

COEFFICIENTS

A = 0.0

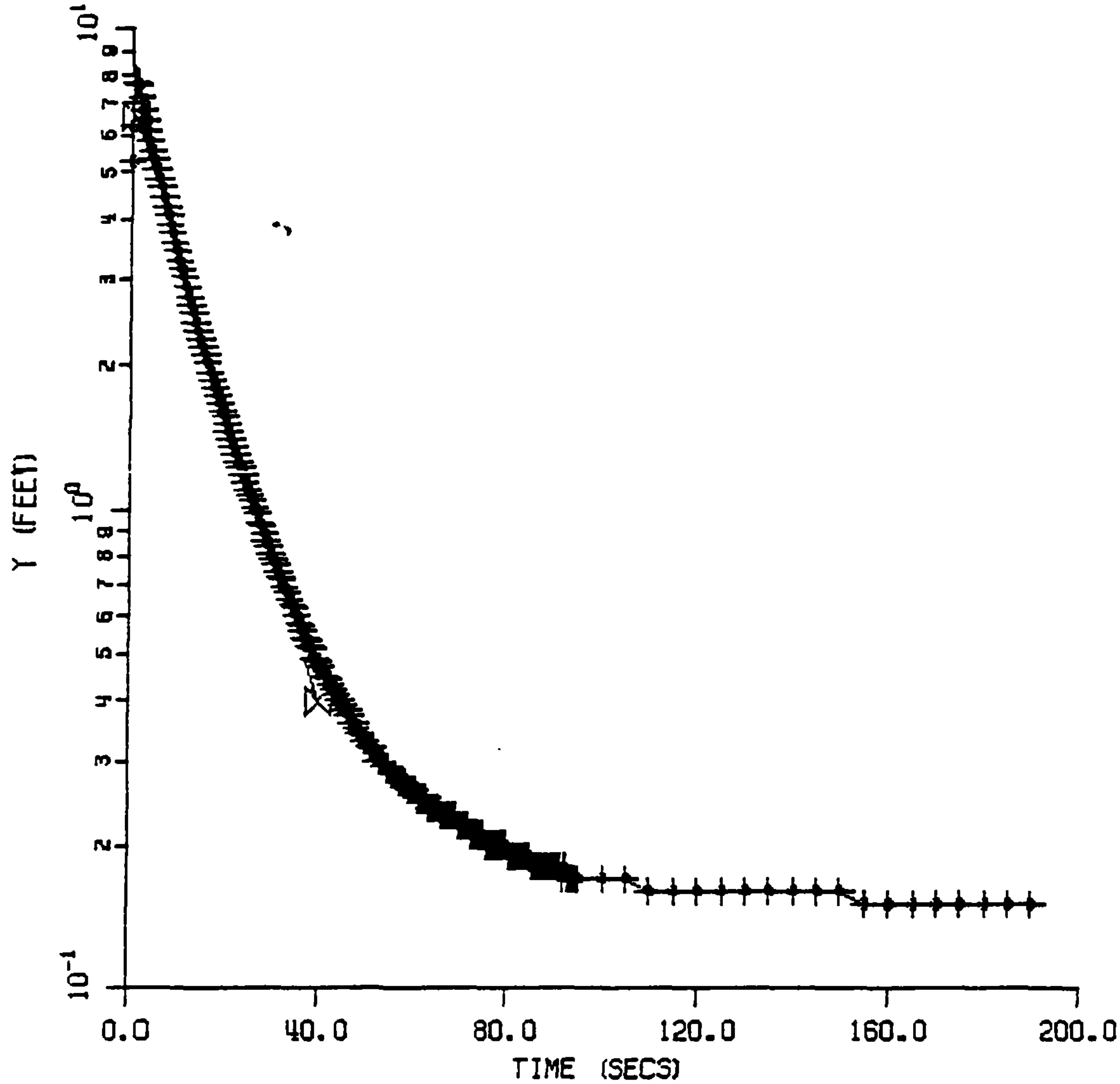
B = 0.0

C = 4.7

Y-INTERCEPT = 7.1

SLOPE = -0.0

NSL/ECC
ECCMW20 TEST 2



K (CM/S) = 0.003181

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 23.0

COEFFICIENTS

A = 0.0

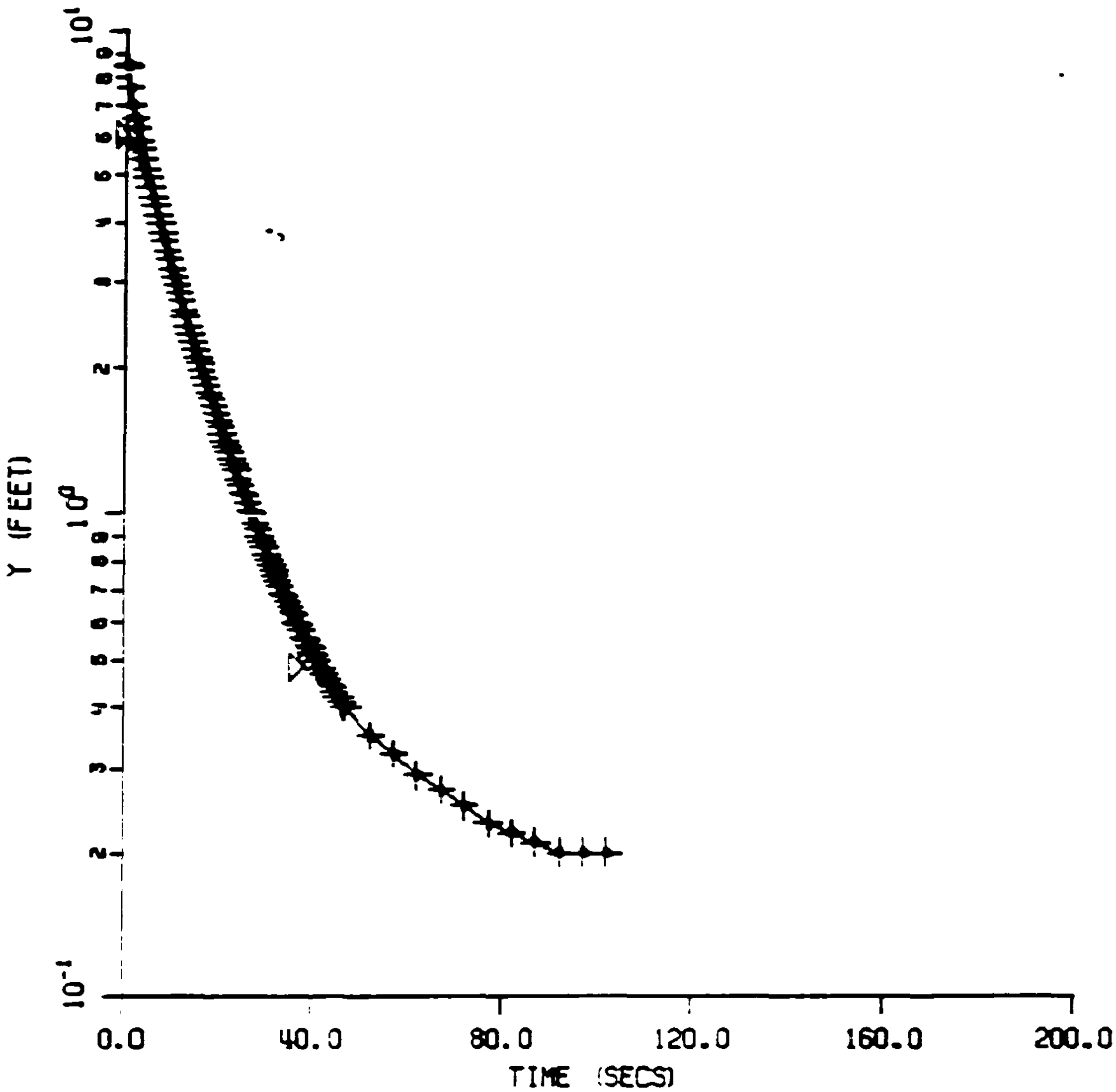
B = 0.0

C = 4.7

Y-INTERCEPT = 6.8

SLOPE = -0.0

NSL/ECC
ECCMW20 TEST 3



K (CM/S) = 0.002050

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 23.0

COEFFICIENTS

A = 0.0

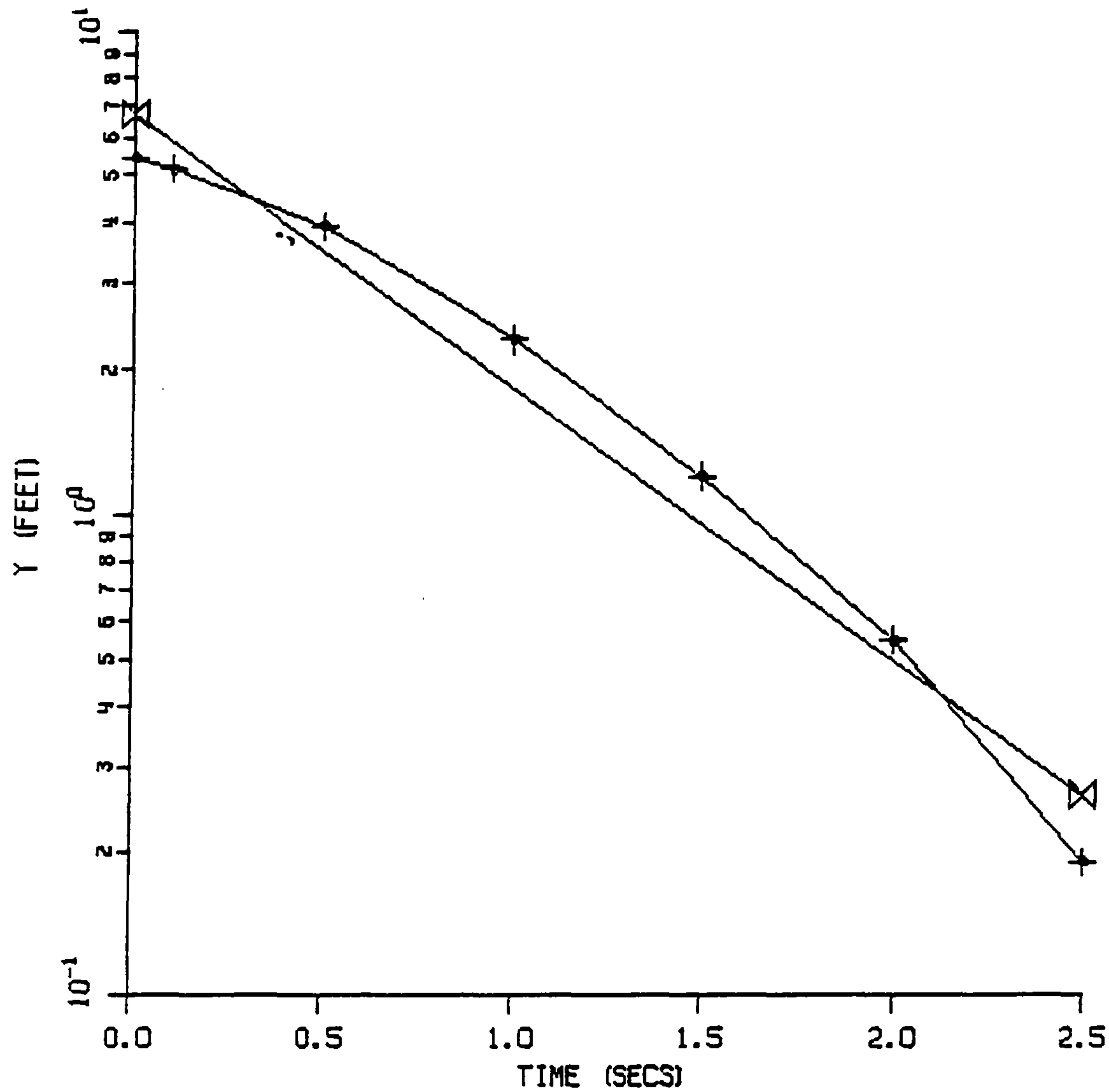
B = 0.0

C = 6.3

Y-INTERCEPT = 6.3

SLOPE = -0.0

NSL/ECC
ECCMW21 TEST 1



K (CM/S) = 0.040843

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 21.0

COEFFICIENTS

A = 0.0

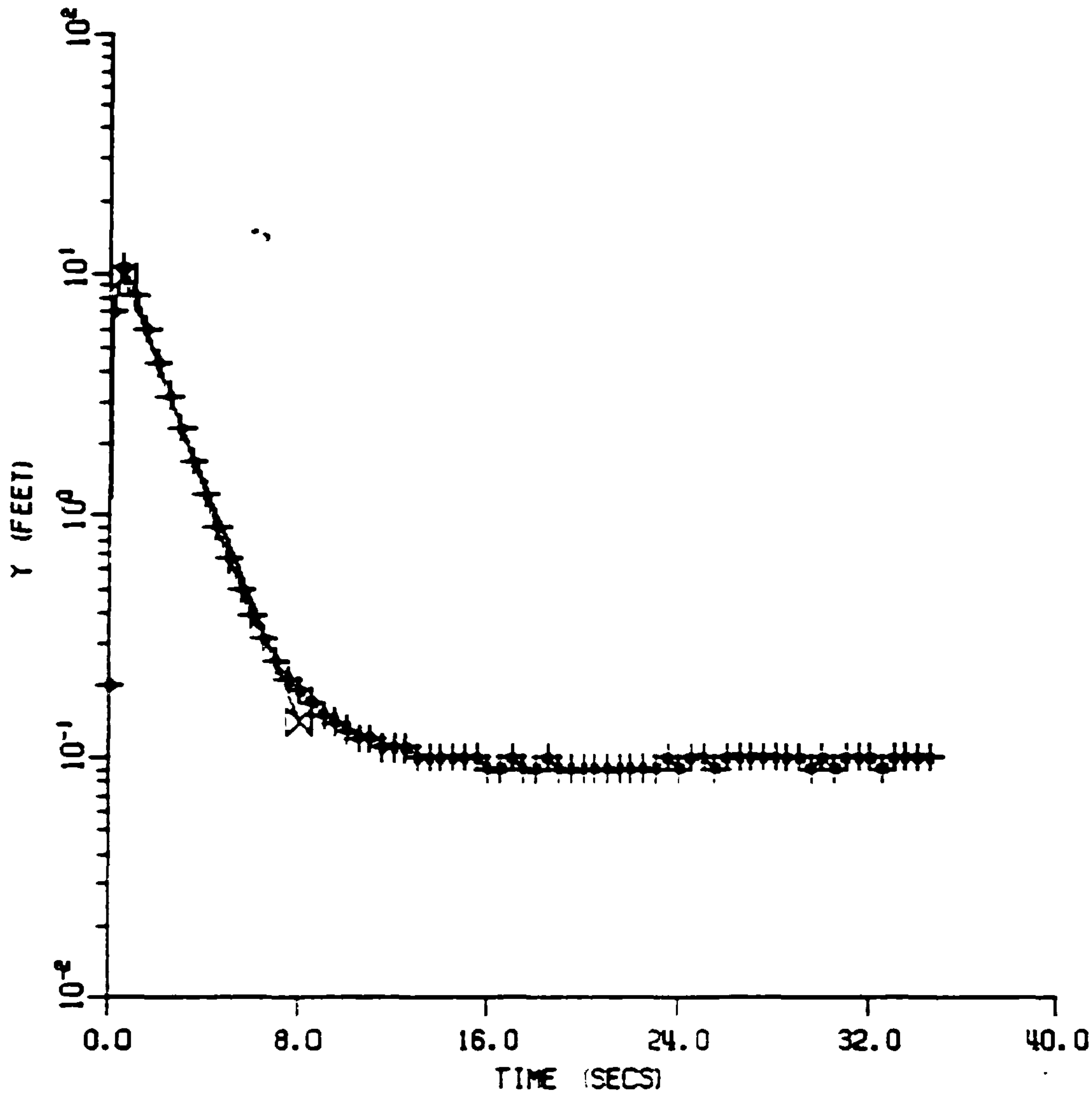
B = 0.0

C = 6.3

Y-INTERCEPT = 6.7

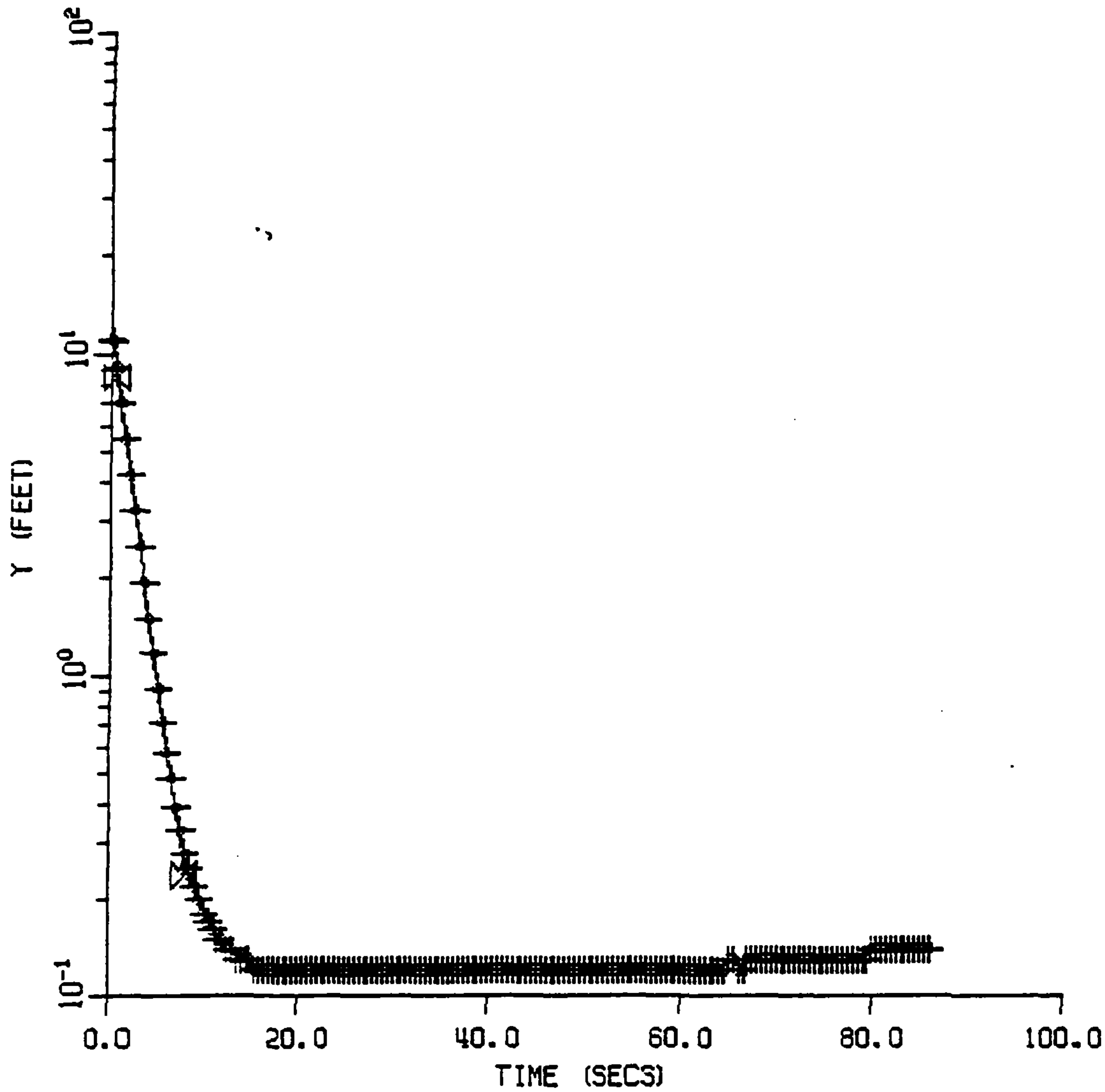
SLOPE = -0.6

NSL/ECC
ECCMW21 TEST 2



K (CM/S) = 0.017767	COEFFICIENTS
WELL SPECS. (FEET)	A = 0.0
SCREEN LENGTH = 15.0	B = 0.0
WELL SCREEN/BORE RADIUS = 0.1	C = 6.3
WELL CASING RADIUS = 0.1	Y-INTERCEPT = 12.9
AQUIFER THICKNESS = 21.0	SLOPE = -0.2

NSL/ECC
ECCMW21 TEST 3



K (CM/S) = 0.014962

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 21.0

COEFFICIENTS

A = 0.0

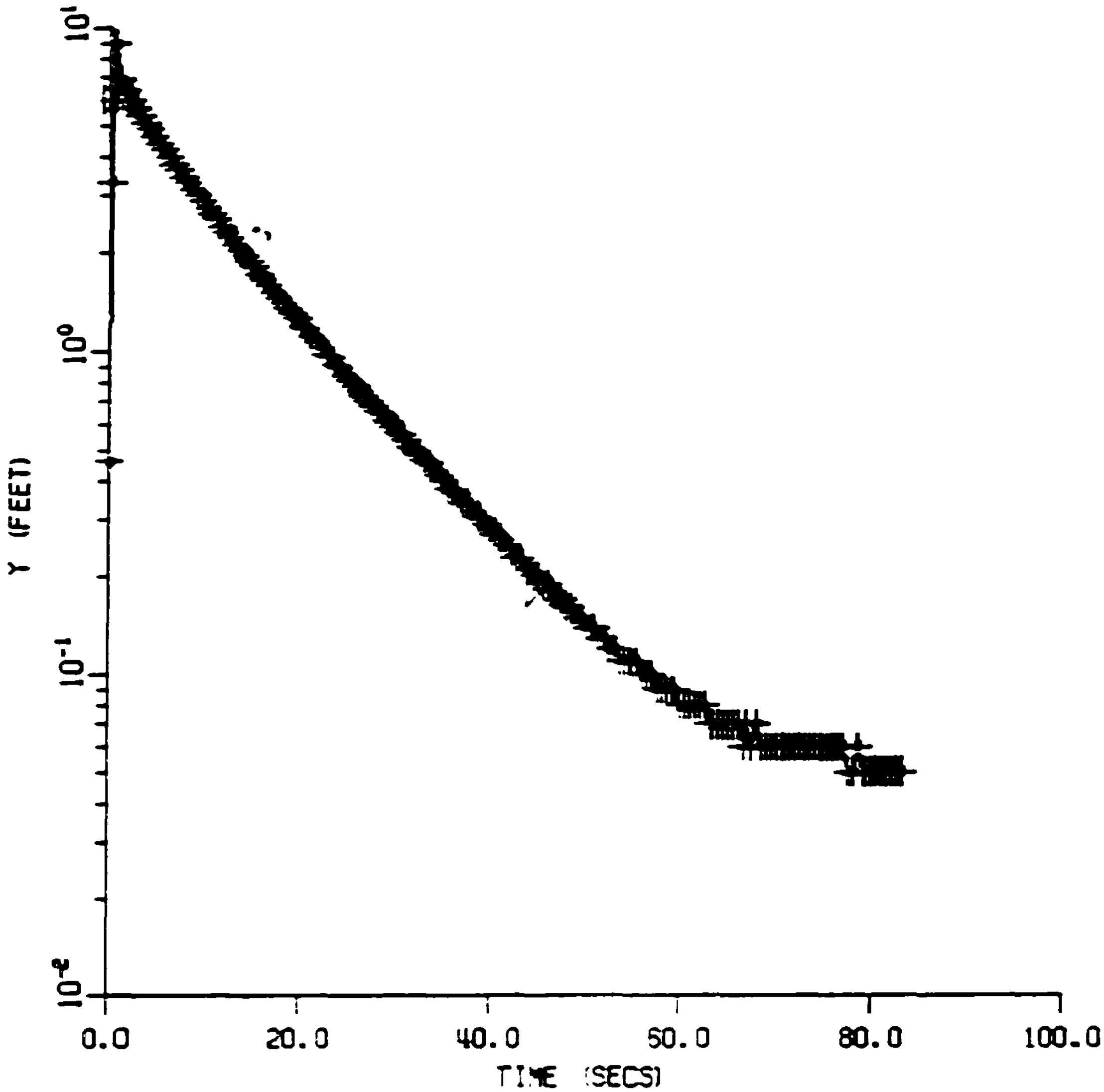
B = 0.0

C = 6.3

Y-INTERCEPT = 10.7

SLOPE = -0.2

NSL/ECC
ECCMW22 TEST 1



K (CM/S) = 0.003601

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 26.0

COEFFICIENTS

A = 0.0

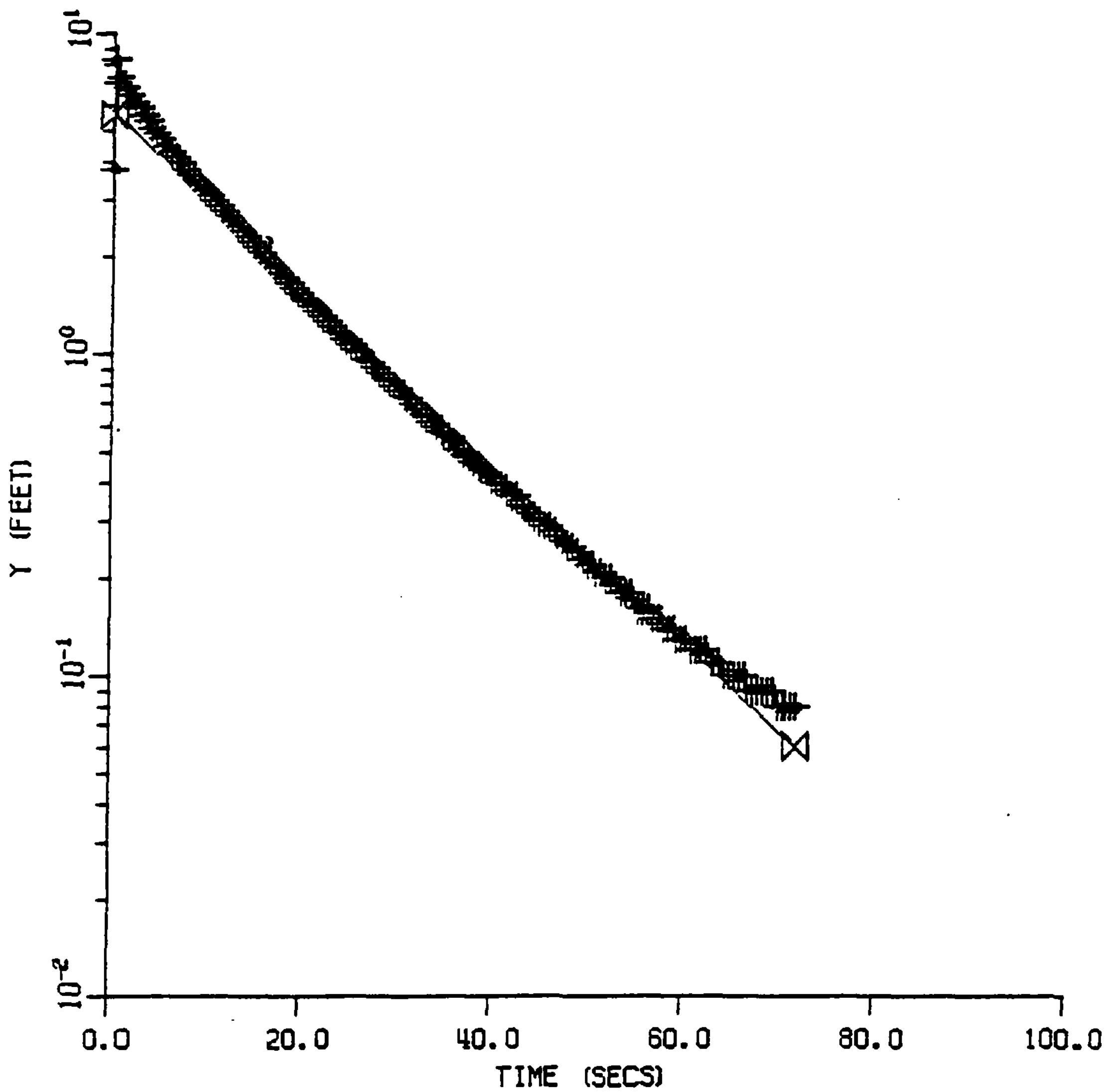
B = 0.0

C = 4.7

Y-INTERCEPT = 6.3

SLOPE = -0.0

NSL/ECC
ECCMW22 TEST 2



K (CM/S) = 0.002867

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 26.0

COEFFICIENTS

A = 0.0

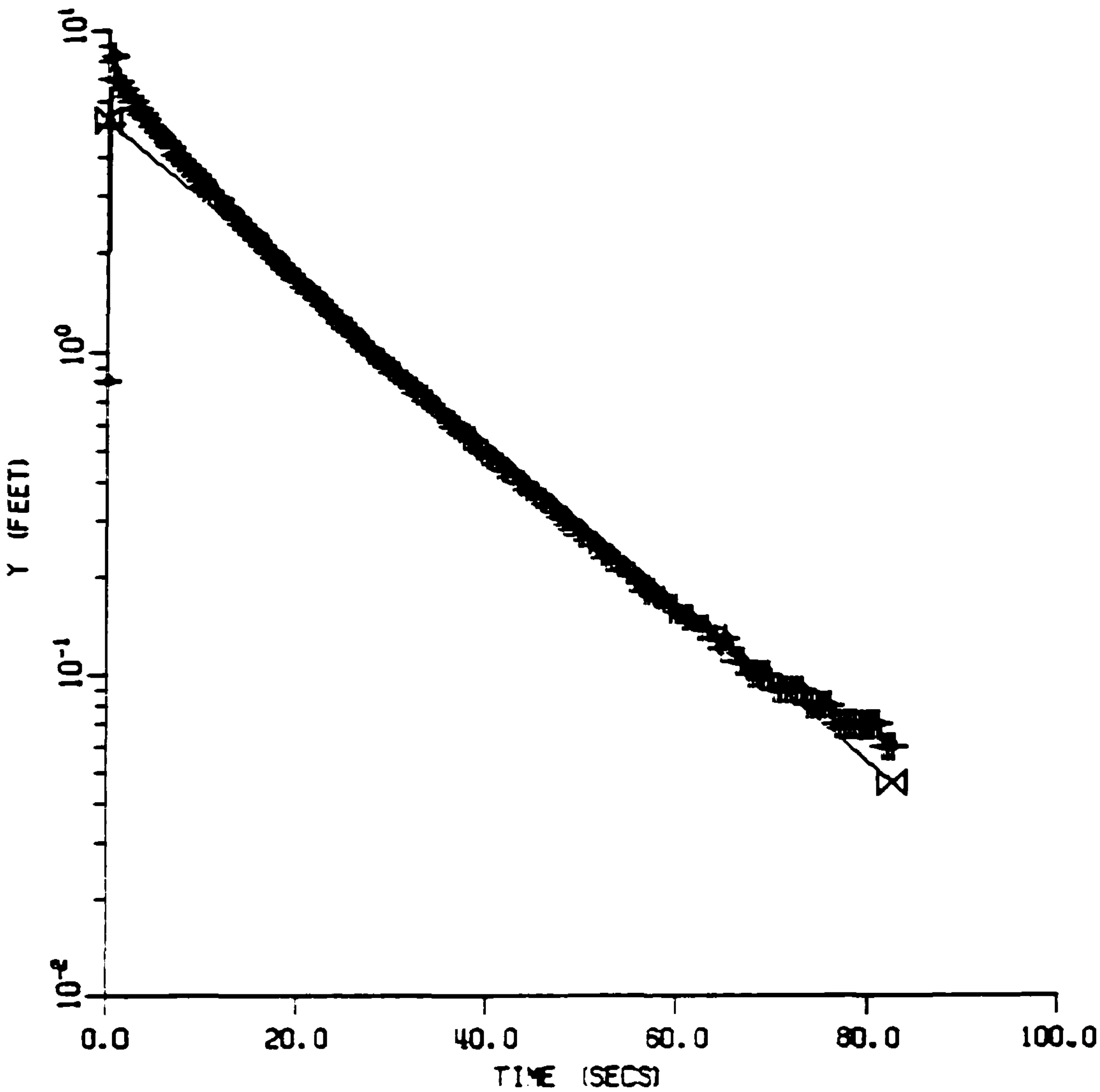
B = 0.0

C = 4.7

Y-INTERCEPT = 5.6

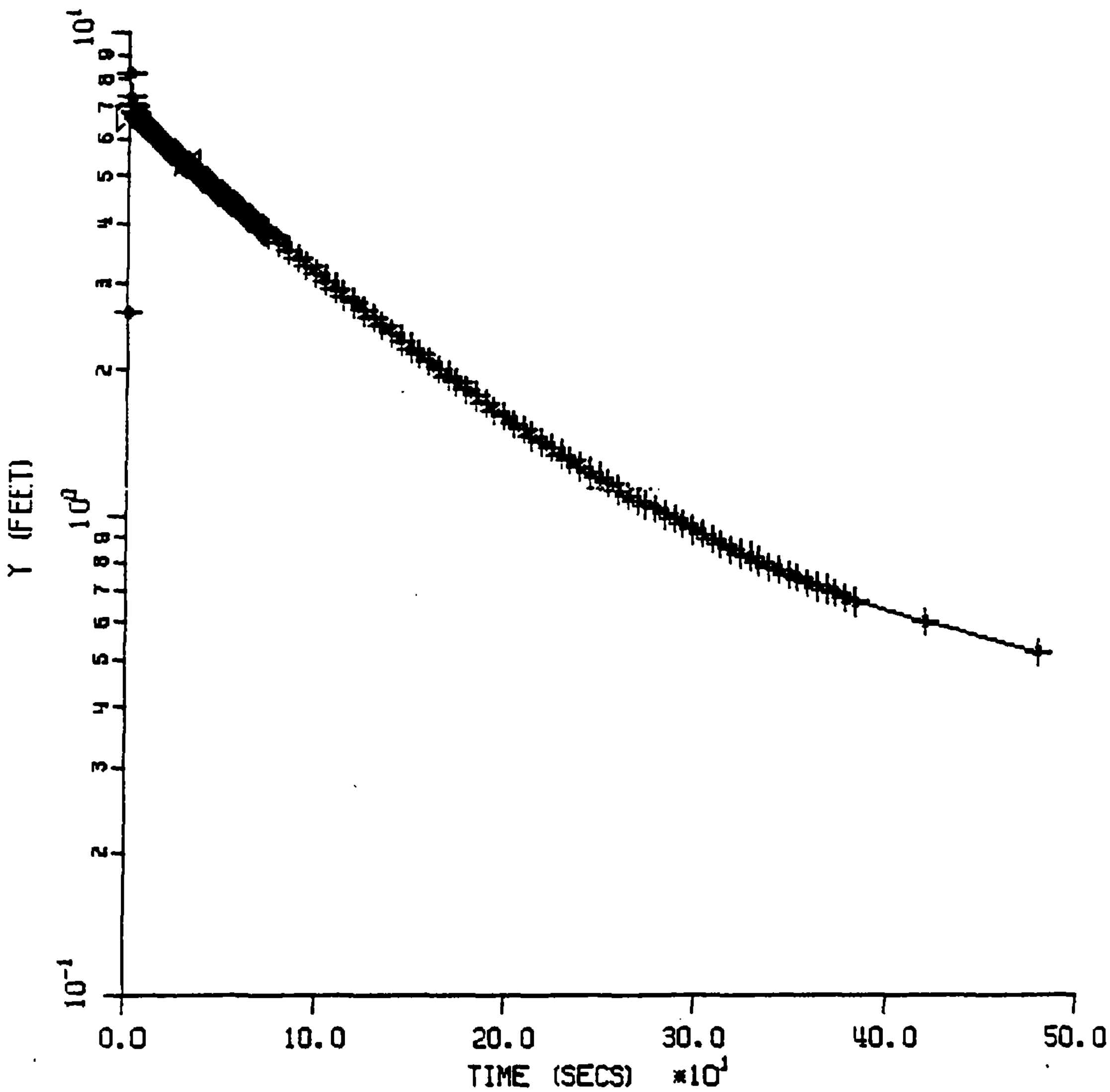
SLOPE = -0.0

NSL/ECC
ECCMW22 TEST 3



K (CM/S) = 0.002608	COEFFICIENTS
WELL SPECS. (FEET)	A = 0.0
SCREEN LENGTH = 10.0	B = 0.0
WELL SCREEN/BORE RADIUS = 0.1	C = 4.7
WELL CASING RADIUS = 0.1	Y-INTERCEPT = 5.2
AQUIFER THICKNESS = 26.0	SLOPE = -0.0

NSL/ECC
ECCMW23 TEST 1



K (CM/S) = 0.000299

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 16.0

COEFFICIENTS

A = 0.0

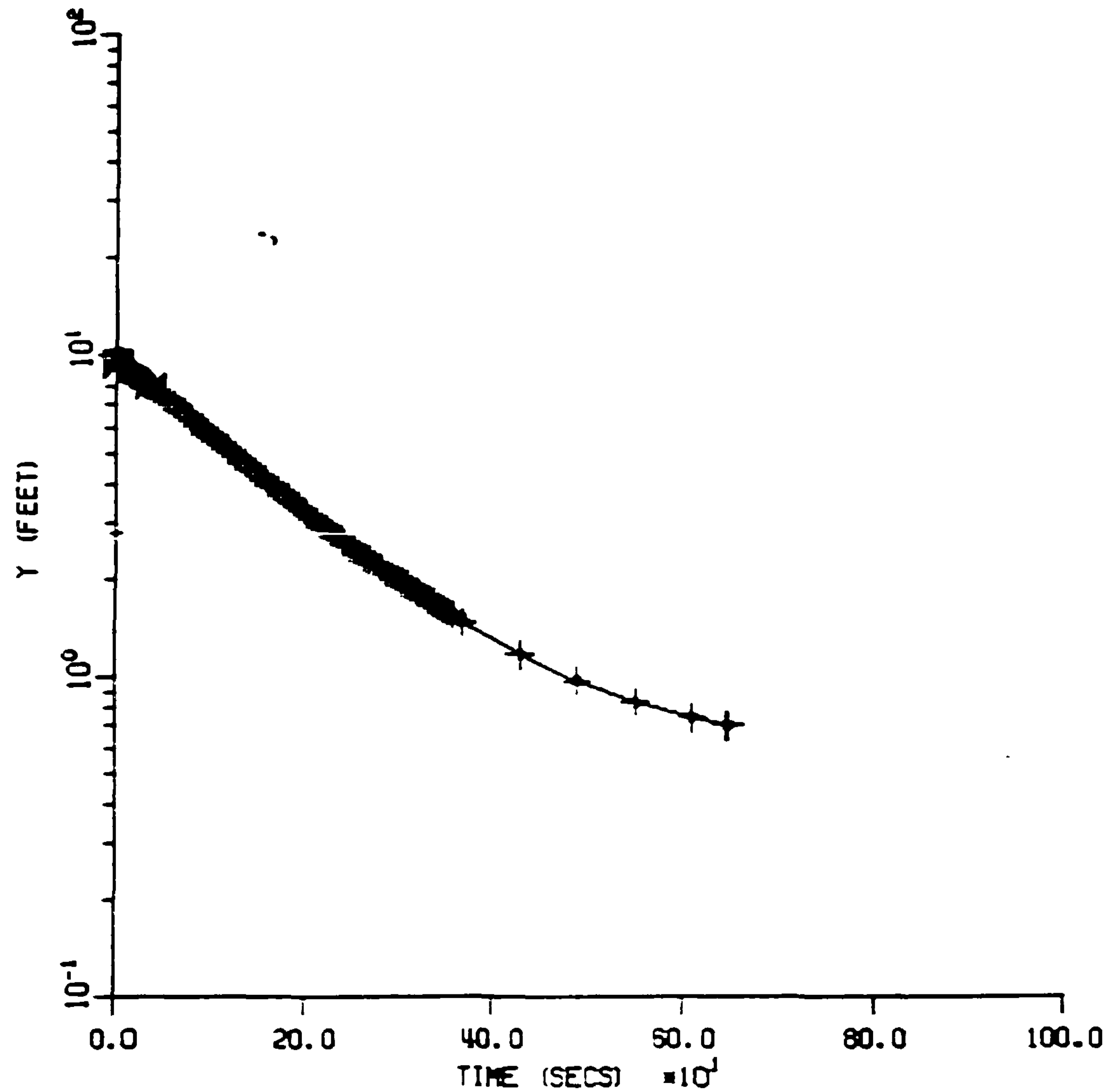
B = 0.0

C = 4.7

Y-INTERCEPT = 6.6

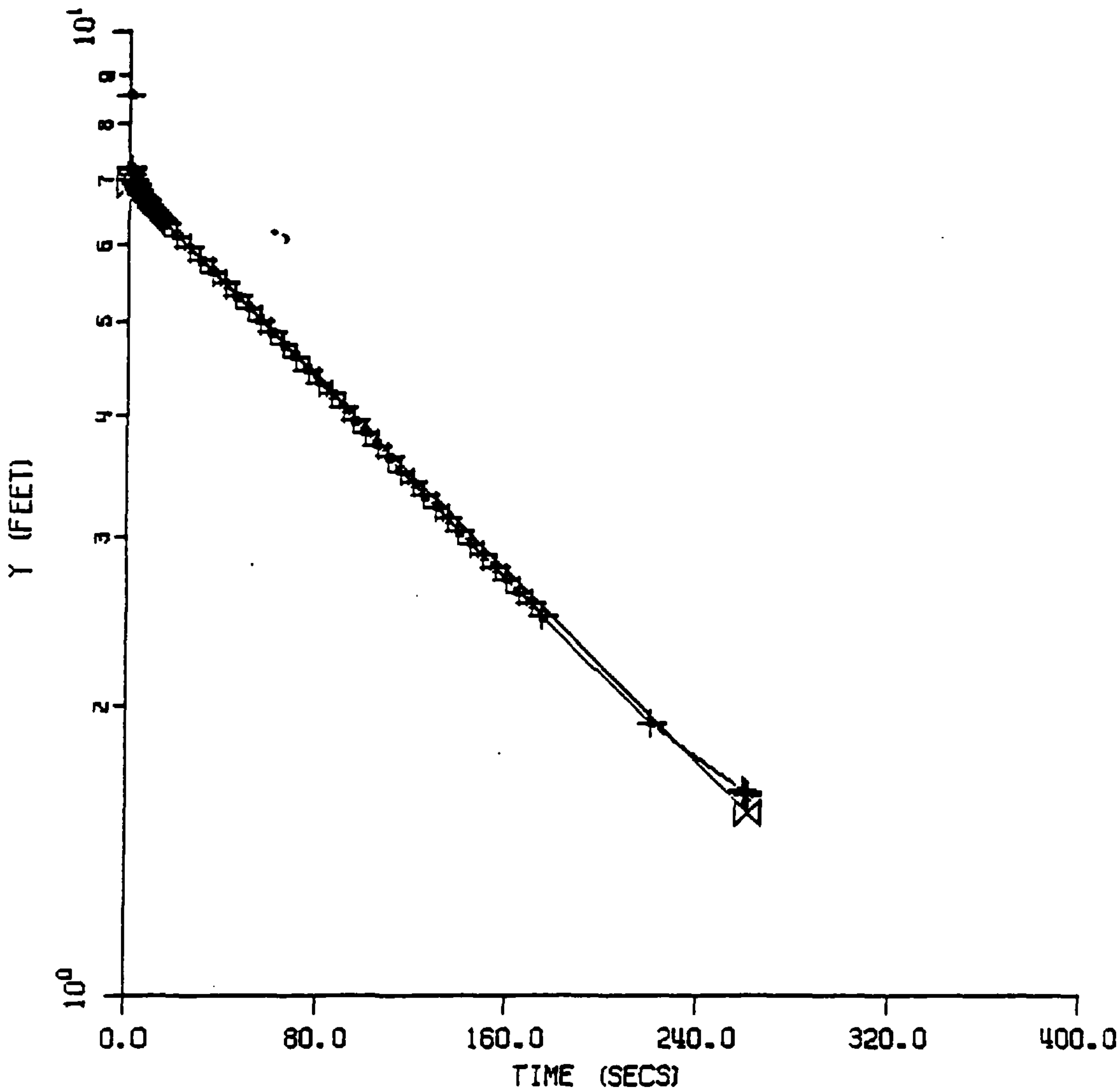
SLOPE = -0.0

NSL/ECC
ECCMW23 TEST 2



K (CM/S) = 0.000188	COEFFICIENTS
WELL SPECS. (FEET)	A = 0.0
SCREEN LENGTH = 10.0	B = 0.0
WELL SCREEN/BORE RADIUS = 0.1	C = 4.7
WELL CASING RADIUS = 0.1	Y-INTERCEPT = 9.4
AQUIFER THICKNESS = 16.0	SLOPE = -0.0

NSL/ECC
ECCMW23 TEST 3



K (CM/S) = 0.000245

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.1

WELL CASING RADIUS = 0.1

AQUIFER THICKNESS = 16.0

COEFFICIENTS

A = 0.0

B = 0.0

C = 4.7

Y-INTERCEPT = 6.9

SLOPE = -0.0

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

105 South Meridian Street
P.O. Box 6015
Indianapolis 46206-6015
Telephone 317-232-8603

September 29, 1989

Karen Vendl
Remedial Project Manager
U.S. EPA, Region V (5HS-11)
230 South Dearborn Street
Chicago, IL 60604

Re: Comments to 1989 Record of Decision (ROD) Amendments, Environmental Conservation and Chemical Corp. and Northside Landfill Zionsville, Indiana Superfund Sites

Dear Ms. Vendl:

A review of the 1989 ROD Amendments for the Environmental Conservation and Chemical Corporation and Northside Landfill Superfund sites has been performed by IDEM Staff. This letter is in confirmation to the faxed comments sent to you on September 6, 1989. The following comments are made to those amendments.

Page 1 Site Names and Location
Location description is not contained in this section as noted in the section heading.

Page 2 Line number 1, 'Description of the Remedies'
"...the 1987 Record of Decision is reflect the decision..." should read "...the Record of Decision is to reflect the decision...".

Page 3 'Declaration,' line number 1
"The selected remedies, as ammended, are protective..." is suggested to read "...remedies, as amended herein, are...".

Page 5 Paragraph 1, 'Location and Description - ECC and NSL', first sentence
"...Superfund National Priorities List, and are adjacent to each other." should read "... List, and located adjacent to each other.".

Page 5 Paragraph 1, 'Location and Description - ECC and NSL', fourth sentence
"...amendment to the 1987 ROD." should read "...amendment of the...".

Page 5 Paragraph 2, 'Location and Description - ECC and NSL', first sentence

Reference is made to Figure 1. Is this made in reference to Figure 1 of the 1987 ROD, to a new Figure 1 to be contained in the 1989 ROD Amendments, or to a reproduction of a Figure from the 1987 ROD which is to be placed in the 1989 Amendments?

Page 5 Paragraph 2, Location and Desciption - ECC and NSL, third sentence "...within one-half mile of the facilities." should read "...within one-half mile of these facilities.".

Page 6 Paragraph 2, Location and Description - ECC and NSL, third sentence "...located within a mile of the sites." should read for consistency in previous text "...within one mile of the sites.".

Page 6 Paragraph 1, Location and Description - ECC and NSL
Same comment applies as above regarding reference to Figure 1.

Page 6 Paragraph 1, 'Site history and Enforcement Activities' - ECC first sentence
"...brokering..." should this read "...brokerage..." to maintain tense (?).

Page 8 Item one, first line
"-The used of soil vapor ..." should read "-The use of...".

Page 11 Description of Modified Remedy - ECC
paragraph 1, line 1
Same comment for Exhibit A applies as above regarding reference to Figure 1.

Page 12 Soil Vapor Extraction, Concentration and Destruction, line 2
Same comment for Attachment 1 applies as above regarding reference to Figure 1.

Page 13 Soil Vapor Extraction, Concentration and Destruction, line 6
Same comment for Appendix C applies as above regarding reference to Figure 1.

If you have any questions, please contact Mr. Prabhakar Kasarabada at (317) 243-5130.

Very truly yours,

Reginald O. Baker Jr.

Reginald O. Baker, Chief
Site Management Section
Office of Environmental Response

PK/mg

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

105 South Meridian Street
P.O. Box 6015
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May 9, 1989

Ms. Karen Vendl
U.S. Environmental Protection Agency
230 S. Dearborn Street
Chicago, Illinois 60604

Dear Ms. Vendl:

This letter serves to convey the State's final comments regarding the Environmental Conservation and Chemical Corporation (ECC) Potentially Responsible Party (PRP) remedial action submittal titled "Exhibit A" which was presented to the IDEM on March 28, 1989. In addition, the State's final position on the verification and compliance sampling is addressed.

The IDEM views Exhibit A as a Statement of Work which outlines the concept of the remedial action that will be undertaken by the ECC PRPs. It does not view Exhibit A as a final design document. Only after the Revised Plans and Specifications are submitted and approved by the State and the U.S. EPA will the technical aspects of the remedy be finalized.

<u>Exhibit A Comments</u>

2.0 Remedial Action Plan
Page 1 and 2

The first five bullets should mention PCBs in addition to VOCs, base neutral/acid organics and heavy metals.

Page 3, first full paragraph

The reference to "clean closure" should be eliminated.

Page 3, first full paragraph, last sentence.

The soil vapor extraction system (SVES) will achieve only the VOC and selected base neutral/acid organic cleanup standards. The RCRA cap will be the component of the remedy which eliminates exposure to the metals and PCBs.

Page 3, second paragraph.

The purpose of the RCRA cap is to prevent infiltration of both atmospheric air and water resulting in a more efficient soil vapor extraction system.

Page 3, last paragraph.

Soil vapor will also be measured during and after (restart spikes) the operation of the SVES. Soil samples will be collected after the SVES is shut down to confirm the system's effectiveness. All monitoring components need to be mentioned.

2.1 Elements of the RAP
Page 4

All three bullets should state that the SVES will affect VOCs and selected base neutral/acid organics. The SVES will not remediate metals and PCBs.

Page 5

First full paragraph.
There is reference to the pilot test as being part of Exhibit A. It was not attached to the document reviewed.

Figure 2-1

What kind of samples will be collected in the sample bottles shown on the left side of the diagram? There should be a mechanism for sampling the water in the extraction trench well prior to its extraction. The water extraction process may release VOCs. Consequently, samples collected in the sample bottles would give erroneously low readings.

Further, what is meant by the "battery limits" shown in the middle of the diagram?

Figure 2-3

The drainage ditch along the west and south side of the concrete pad is not shown.

Page 8, second and third paragraph.

Any material excavated from the injection and extracion trenches and the dead man trench must be graded onto the site prior to cap construction. The excavated material must not be incorporated into the cap. This should be clearly expressed in the text.

Figure 2-4

Sequence of Activities.
A new number 6 should state, excavated material will be spread and graded onto the site as specified. The old number 6 and each succeeding number should be increased by one.

The old number 8 (new number 9) should state that the sand is a drainage layer, not a protective layer.

Figure 2-5

The cross sections referenced in this figure (A-A, B-B, etc.) do not appear on any map. References need to be provided.

Page 9, first sentence.

How will water be removed from the water collection pipe if the airlift piping is not in place? Further, will valves at the top of the water collection pipe prevent samples from being collected from the bottom of the water collection pipe? The system should be designed to allow such samples to be collected.

Page 9, second paragraph.

The water recovered from the 20' by 20' sump must be treated in a manner similar to the water recovered by the water entrainment system. It will be handled as per federal, State and local requirements.

Page 10, top of page.

The zone of influence determined by the Terre Vac pilot test was between 17' and 18'. The zone of influence mentioned in this paragraph is 20'. This discrepancy must be resolved. The last sentence of this paragraph states that the pressure differential between the injection and extraction trenches is approximately 19.4 inches Hg. This is the differential under maximum vacuum conditions. The normal vacuum differential 25.4 Hg.

Page 12, first paragraph.

The tank size of the water extraction system and the off-site handling/treatment option selected to treat the collected water will need to be provided in the Revised Plans and Specifications. These are the type of details that need to be approved prior to the implementation of the remedy. A sentence stating that the tank will be of sufficient size to handle all water collected on-site should be added to this paragraph.

Page 13, second paragraph.

The calculations showing the amount of carbon needed to filter the soil vapors may or may not be correct. A sentence stating that whatever amount is actually needed to properly filter the soil vapor during the entire operational phase of the SVES needs to be included in this paragraph.

Page 16, first bullet.

The water collection pipes should be configured to allow bailers to collect water from the bottom of the pipe.

2.1.1 RCRA Compliant Cover, page 17.

The RCRA cap requirements listed in 40 CFR 265.310 should be listed in this section in addition to the information already included.

Page 18, second paragraph.

The diagram on Figure 2-5 shows the deadman trench being filled with bentonite. This paragraph indicates the trench is filled with native soil. This detail will have to be finalized.

Page 19, first paragraph.

The vegetation used on the cap should conform to Indiana Department of Highways specifications with no non-native species being utilized. The access restrictions sections indicates that the owner will impose the access restrictions. This will have to be formalized in order to give adequate assurances that the restrictions will actually be implemented.

2.1.4 Ground Water and Surface Water Monitoring, first bullet.

The monitoring should detect, in addition to the VOCs, any base neutral/acid organics, PCBs and inorganics.

Page 21, first paragraph.

The VOC results from the on-site till wells will not be used to calculate soil concentrations for comparison to soil cleanup standards. Soil sample results will be compared to the calculated soil cleanup levels to determine whether the soil has been adequately cleaned up.

Figure 2-7

The existing monitoring well in the sand and gravel (ECC MW-13) lense located in the southeast corner of the site should be included on the map because it will be included in the monitoring well network. Further, as a result of staff's conversations with ERM on April 5, 1989, it was decided that a piezometer drilled into the sand and gravel aquifer on the eastern side of the site near the middle till well would be needed to better define the groundwater flow in that area.

Page 22, entire narrative.

The narrative on this page will have to be modified to reflect the monitoring program detailed later in this memorandum.

3.0 Remedial Action Cleanup Standards, page 23.

The reference to clean closure should be eliminated in the first, second and third paragraphs on this page. The second sentence of the first paragraph should be charged to state "... action thereafter, VOCs from the site should not adversely affect any environmental media, including ground water, surface water or the atmosphere, and with the installation of the RCRA cap, direct contact through dermal exposure, inhalation, or ingestion will not result in a threat to human health or the environment."

3.1 Cleanup Standards, first bullet.

The first bullet should state VOC soil concentrations will not exceed levels shown on Table 3.1.

Page 23, second bullet.

The stream criteria listed on Table 3-1 should not be exceeded in the compliance monitoring wells located along the east side and southeast corner of the site along Unnamed Ditch. The Acceptable Ground Water Concentrations should not be exceeded in the on-site till wells.

Table 3-1

The column containing Acceptable Soil Concentrations should only include VOCs and Base Neutral/Acid Organics. The methodology employed by ERM to arrive at inorganic cleanup levels is not acceptable. Consequently, the soil cleanup numbers listed for inorganics should be removed. Further, the arsenic stream concentration and PCB stream and ground water concentrations should be included. It is acknowledged that some standards are below background and that for those parameters an adjustment to the cleanup standards may be appropriate.

Finally, as per conversations with Elsie Millano of ERM, the IDEM conveyed concern regarding Acceptable Ground Water Concentrations on Table 3-1 for the following parameters:

	Table 3-1	IDEM's Suggested Number
Chlorobenzene	1,050	60 (PMCLG)
Ethyl Benzene	3,500	680 (PMCLG)
Methyl Ethyl Ketone	1,750	170 (lifetime)
Toluene	10,500	2,000 (PMCLG)
Total Xylenes	70,000	440 (PMCLG)
Nickel	700	150 (lifetime)
Cyanide	700	154 (lifetime)

Page 25, 3rd paragraph.

The narrative for soil concentrations for PCBs and metals is not appropriate due to the fact that the SVES will not remediate those parameters.

3.5 Peticides/PCBs, page 27.

The monitoring of on-site till wells will be used to confirm theory that the PCBs will not migrate via the groundwater and consequently present no risk to either human health or the environment. A statement of this nature should be included in this section.

3.6 Inorganics

As has been stated previously, the State does not agree with the methodology employed by ERM to develop inorganic soil cleanup numbers. The primary concern is ground water contamination. Therefore, the on-site till wells will be the primary means of determining whether the inorganics are a threat to the public health or environment.

3.7 Additional Work, page 29, third bullet.

"Additional Work" is required at the site. The monitoring requirements for shutting down the groundwater collection trench will need to be developed.

Figure 3-2.

The figure appears to show the ground water interception trench facing away from the site. This should be clarified.

4.0 Remedial Action Compliance Monitoring, page 30.

The compliance monitoring section will have to include soil samples in addition to ground water, surface water, and soil vapor. Further, this entire section will have to be amended to reflect the monitoring program which will be outlined later in this memorandum.

Page 31, first paragraph.

The sentence which states "... by definition" should be changed to state "in theory".

4.3 Water Till Analysis, page 33.

This section will have to be modified to reflect the changes in the monitoring program as outlined later in the memorandum.

Table B4

The fact that Unnamed Ditch has a Q7-10 low flow of 0 cfm precludes the use of a dilution factor. Consequenly, the stream criteria have to be met in the line of monitoring wells along Unnamed Ditch. All dilution that would have occurred under the site will be reflected in the wells at the point of compliance. Background levels for certain parameters may be above the stream criteria. Therefore, background numbers developed from properly located monitoring wells may be used.

The compliance and verification monitoring scheme proposed by the IDEM and the U.S. EPA on March 24, 1989, and counter proposed by the ECC PRPs on April 11, 1989, have not yet been finalized. The monitoring scheme that follows represents the final position of the State on this matter.

ECC Monitoring

The ECC remediation calls for soil vapor extraction to reduce the amount of compounds that are the most prone to migrate off-site via ground water movement. However, there are other constituents in the soil such as metals and PCBs which will not be removed by the soil vapor extraction system (SVES). Consequently, a monitoring plan which adequately determines concentrations of volatile organics, base neutral/acid extractable organics, inorganics and PCBs in the media of concern is required to verify that the site does not present a potential threat to human health and the environment both now and in the future. To accomplish this level of protection, the following scheme will be implemented to determine compliance with the Cleanup Standards in Table 3-1.

1. Soil Vapor Extraction System Monitoring

During the operation of the SVES the extracted vapor will be monitored as outlined in Section 4.2 of Exhibit A. The methodology used to determine soil vapor levels that are in equilibrium with acceptable soil concentrations, as well as a tabulation of those numbers, are included in Section 4f of Exhibit A. The SVES distribution system will be maintained until the remedy is complete.

The system will be restarted once per week to determine whether restart spikes demonstrate vapor concentratons to be in equilibrium with soil concentrations below the specified soil cleanup levels.

2. Soil Samples

Once four consecutive restart spikes, as described above, indicate that the specified soil cleanup levels have been achieved, a total of sixteen soils samples from "hot" spots, plus four non background samples from randomly selected points elsewhere on-site will be collected. All soil samples will be analyzed for the VOCs in Table 3-1, as well as for base neutral/acid organics. The results of the analyses will be evaluated for compliance with the levels specified in Table 3-1 using the statistical procedure described in Appendix E.

3. On-Site Till Samples

The on-site till wells will be monitored on a quarterly basis during the operation of the SVES. After the SVES is shut down, these on-site wells will be sampled for seven years on a semi-annual basis. The on-site wells will be sampled for the volatiles, base neutral/acid extractable organics, inorganics and PCBs shown on Table 3-1.

Verification of VOC Cleanup

Operation of the SVES may be discontinued as described in Exhibit A, Sections 2.1.4 and 4.2. However, verification of soil cleanup will not be established until; 1) four consecutive restart spikes are below the calculatd equilibrium point; 2) the post-SVES soil samples show compliance with the specified soil cleanup levles for volatiles, base neutral/acid organic); and 3) on-site till wells show compliance with acceptable Ground Water Concentrations specified in Table 3-1. If the verification sampling from any of the above components show exceedances of their corresponding soil cleanup levels specified in table 3-1, the SVES must be restarted and continued until the above verification techniques show no exceedances of the soil cleanup levels specified in Table 3-1 or until additional work is implemented as outlined in Section VII of the Consent Decree and Section 3.7 of Exhibit A.

4. Compliance Monitoring

The off-site till wells, sand and gravel wells and the surface water will be sampled on a quarterly basis during the operation of the SVES. Sampling will be conducted on a semi-annual basis thereafter to coincide with the on-site till well analysis. Once it has been determined that the soil cleanup levels have been achieved by the restarts, the on-site till well analysis and the soil sampling (as described above), the off-site compliance wells and surface water sampling will be discontinued if the monitoring results have shown no exceedances of the established ground water and stream criteria specified in Table 3-1 during the seven years of on-site till well monitoring. Samples from the wells and surface water will be analyzed for the VOCs, base neutral/acid exrtractable organics, PCBs and inorganics shown in Table 3-1.

If the off-site compliance ground water monitoring wells and surface water samples indicate off-site contamination above the corresponding levels in Table 3-1, additional remedial measures consistent with Section VII of the Consent Decree and Section 3.7 of Exhibit A may be required.

Semi-annual off-site ground water and surface water compliance monitoring will continue for a period of five years after any additional remedial measures have achieved the ground water standards and stream criteria specified in Table 3-1.

Last sentence.

The soil vapor extraction system (SVES) will achieve only the VOC and selected base neutral/acid Cleanup Standards. The RCRA cap will be the component of the remedy which eliminates exposure to the metals and PCBs. This should be stated in this sentence.

Second paragaraph.

The purpose of the RCRA cap is to prevent infiltration of ambient atmosphere air in addition to water resulting in a more efficient soil vapor extraction system.

Last paragraph.

Soil vapor will also be measured during and after (restart spikes) the operation of the SVES. Soil samples will be collected after the SVES is shut down to confirm the system's effectiveness. All monitoring components need to be mentioned.

2.1 Elements of the RAP, page 4

All three bullets should state that the SVES will affect VOCs and selected base neutral/acid organics. The SVES will not remediate metals and PCBs.

The monitoring program follows closely to the proposal submitted the the IDEM and the U.S. EPA on April 11, 1989, by ERM. the major charges involve the reduction in the length of time between restart spikes from six months to one week, extending the on-site monitoring period from five to seven years and having the off-site monitoring program coincide with the on-site monitoring program.

Finally, the IDEM agrees to accept the organic carbon content number used by ERM in its calculation of soil cleanup standards.

As stated prevously, the postion outlined above represents the final position of the IDEM on the ECC monitoring. Staff believes the compromises proposed are technically sound and fair.

It is our hope that there are no remaining technical issues to be resolved, with the exception of statistical analyses, and that the way is now clear for a rapid conclusion of negotiations. If you have any questions, please contact Mr. John Buck at AC 317/243-5041.

Very truly yours,

Reginald O. Baker

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Office of Environmental Response

JPB/cd